"STRESS RESPONSE IN OPEN AND LAPAROSCOPIC PROCEDURES''

Dissertation submitted

To

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI

With partial fulfillment of the regulations for the award of the degree of

M.S (General Surgery)

Branch-I

Government Kilpauk Medical College

Chennai- April -2016

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled **"STRESS RESPONSE IN OPEN AND LAPAROSCOPIC PROCEDURES"** is a bonafide and genuine research work carried out by me under the guidance of Prof. K.K.VIJAYA KUMAR MS, department of General Surgery, Kilpauk Medical College, Chennai-10.

This dissertation is submitted to **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI** in partial fulfillment of the degree of M.S. General Surgery examination to be held in **April 2016**.

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CERTIFICATE

This is to certify that this dissertation is the bonafide work of

DR V.P. RAJA SEKAR

On

"STRESS RESPONSE IN OPEN AND LAPAROSCOPIC PROCEDURES''

During his course in M.S. General Surgery from January 2015 to June 2015 at Government Kilpauk Medical College, Chennai-10.

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“ STRESS RESPONSE IN OPEN AND LAPAROSCOPIC PROCEDURES”

INTRODUCTION

INTRODUCTION

Laparoscopy is the newly evolved surgical procedure which allows the surgeon to access the abdomen and pelvis without making the larger incision in the skin. The laparoscopic surgery is also called key hole surgery or minimal access surgery. In conventional open surgical procedure because of larger incision and more handling of internal organs, the patient have increased stress level, increased level of pain, and long recovery time.

Stress is the biological response by the body stimulated by external and internal stimulus, which leads to activation of endocrine and autonomic nervous system to handle the particular situation. During stress cortisol is released in larger amount for various direct and permissive actions to handle the stress situation.

The surgical stimuli are one of the external stimuli for stress. If external stimuli are more than the stress response is also more, which leads to delay in recovery of patient post operatively. In this study I am going to prove that the newly evolved laparoscopic procedure had minimal stress response compared to conventional open surgical procedure.

AIM OF THE STUDY

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In this study I am comparing the stress response in patient undergoing the open surgical procedure and laparoscopic surgical procedure. We should choose the less stressful procedure for the patient for less post operative pain and early recovery to the normal daily activities.

The main aim of our study is

1. To determine the less stress full procedure between open and laparoscopic surgeries.
2. To determine whether the less stress full procedure has less postoperative pain.
3. To determine whether the less stress full procedure having better wound healing.
4. To determine whether the less stress full procedure having short post operative recovery time.

MATERIALS AND METHODS

MATERIALS AND METHODS

STUDY GROUP

Patient admitted in general surgical wards having sub acute appendicitis, inguinal hernia and symptomatic cholelithiasis.

STUDY DESIGN

PROSPECTIVE STUDY

PLACE OF STUDY

Department of General Surgery,

Govt Kilpauk Medical College and Hospital,

Kilpauk, Chennai – 10

DURATION OF STUDY

6 MONTHS

SAMPLE SIZE

100 PATIENTS

(50 Open surgeries and 50 laparoscopic surgeries)

METHODOLOGY

INCLUSION CRITERIA :

- Patient in the age group of above 18 years and below 45 years.
- Patient proven to have sub acute appendicitis, inguinal hernia and symptomatic cholelithiasis undergoing open and laparoscopic procedures with duration of surgery less than 2 hours.

EXCLUSION CRITERIA

- Patient having diabetes, hypertension, asthma, tuberculosis, epilepsy, and psychiatric disorder.
- Patient on any drugs for chronic illness.
- Patient positive for HIV, HbsAg, and Anti HCV

DATA COLLECTION

STUDY VARIABLES

- Serum Cortisol
- Serum Glucose
- CRP

The data of each patient was collected on a proforma specially designed for this study and which includes demographic details, clinical features, past medical history, clinical and laboratory values .

The blood sample of patient was collected at the time admission for pre operative analysis of serum cortisol, glucose and CRP. Post operatively the blood samples are collected 6hrs after surgery for analysis of serum cortisol , glucose and CRP.

The pre operative and post operative laboratory values are analyzed for the statistical significance and correlation

REVIEW OF LITERATURE

What is stress?

The physiological or biological stress is an organism's response to a stressor such as an environmental conditions or a stimulus.

Stress is a body's method of reacting to a challenge. During stress the body activates the sympathetic nervous system which results in fight or flight response. Because of body cannot able to maintain the stress for prolonged time, to achieve homeostasis , the body activate the parasympathetic system to return the body's physiological condition to normal.

The stress response to external stimuli have an impact on person's mental and physical well being.

The word stress used by Walter Cannon in 1926 to refers to external factors that affects the homeostasis.

During stress the physiological or physical equilibrium of the body was disturbed leads to activation of nervous , endocrine and immune system.

The factors which causes organisms conditions diverge from equilibrium can be experienced as stress. A life threatening conditions such as major physical trauma , surgery, starvation , can greatly affects

homeostasis. Organism attempt to restore the stress reverse back to normal by conserving energy and natural resources.

Homeostasis is a concept central to the idea of stress. In human body, the most biochemical process are involved to maintain the steady state equilibrium called homeostasis. Homeostasis is the process of maintaining the body's internal environment in response to change in external environment.

Stress can make the individual highly susceptible to physical illness like the common cold, fever, repeated respiratory infections etc… Research indicates the type of stressor and individual characteristics such as age and physical well being before the onset of stress highly influence the outcome after the onset of stress.

The flight or fight response also called the hyper arousal response which is a normal physiological response to the perceived harmful event attack, or threat to survival. During stress which caused by threats leads to immediate discharge of sympathetic nervous system for priming the animal for fighting response.

NEUROANATOMY OF STRESS

During stress to maintain the equilibrium, the various system in our body come into play together. Mainly central nervous system, autonomic nervous system, and endocrine system plays a major role.

BRAIN

The brain plays a major and critical role in the body's perception of stimuli and response to stress. But the region of brain involved in particular aspect of stress response is unclear and difficult to identify. During stress the brain works in more of a network like fashion and carrying the information about a stressful situation across various regions of brain to combat stress. The information in the central nervous system carried from cortical sensory areas to more basal structures and vice versa can help in explaining how stress and its negative consequences are heavily rooted in neural communication dysfunction.

HYPOTHALAMUS

The hypothalamus is a small portion of the brain located below the thalamus and above the brain stem. The most important function hypothalamus is link together the body's nervous system with

endocrine function. The hypothalamus have many bidirectional neural inputs and outputs from and to the various parts of brain regions. These internal connection within regions of brain helps the hypothalamus in regulating the body's metabolism by secreting the hormones in to the blood stream, which may act on distant target organs outside the central nervous system. During stress response in the body the hypothalamus secretes the various stress hormones in to the blood stream like corticotrophin releasing hormone which stimulates the body's pituitary gland and stimulates the highly regulated stress response pathway.

AMYGDALA

The amygdala is a small almond shaped structure two in number located bilaterally in the substance of medial temporal lobes of the brain. The amygdala is the part of body's limbic system with various bidirectional input and output projections to and from the hippocampus, locus coeruleus and hypothalamus. The amygdala thought to play a major role in emotions, it also have been implicated in modulating the stress response mechanism, particularly when feeling of anxiety and fear was involved

HIPPOCAMPUS

The hippocampus is the another small structure bilaterally located in the deep part of medial temporal lobes of the brain just below the each amygdale. The hippocampus is the part of brain's limbic system and plays a major role in controlling the emotions. The hippocampus is playing the most important role in the memory formation. Like amygdala the hippocampus also have numerous connection to the cerebral cortex and hypothalamus. During stress the hippocampus is particularly important in the cognitive process such as the prior memories can have a great influence on enhancing, suppressing, or even independently generating the stress response. The hippocampus is the one of the areas in the brain susceptible to damage during the period of chronic stress.

PREFRONTAL CORTEX

The prefrontal cortex is located in frontal lobe of brain which is the anterior most region of the cerebral cortex. The major role of prefrontal cortex is to regulate cognitive processes including attention, planning and problem solving through the extensive connection with other parts of the central nervous system. The pre frontal cortex can be impaired during chronic stress response.

LOCUS COERULEUS

The locus coeruleus is the small structure located in the pons of the brainstem. The locus coeruleus is the principal site of the synthesis of the neurotransmitter norepinephrine which plays a important role in stress response through released from nerve endings of sympathetic nervous system. The locus coeruleus involved in various important connections with hypothalamus, amygdala and raphe nucleus among other regions and projects widely across various areas of brain and spinal cord.

RAPHE NUCLEUS

The raphe nucleus is a small area located in a pons of the brainstem. The raphe nucleus is the principal site for the production of the neurotransmitter serotonin. The serotonin plays an important role in mood regulation particularly during stress is associated with anxiety and depression. The raphe nucleus made wide range of connection with hypothalamus and various areas of brain and involved in modulating the organisms circadian rhythm and sensation of pain during the stress response. The raphe nucleus is one of the structures in the central nervous system which are damaged during the chronic stress.

SPINAL CORD

The spinal cord is the neural cord located in the foramina of vertebra which is involved in transmitting the stress response neural impulse from brain to the rest of the body. The hypothalamus initiating the stress response by secreting the neuro endocrine hormones in to the blood stream. In the same way the spinal cord initiates the stress response by transferring the stress impulse from central nervous system to the peripheral nervous system. The sympathetic nervous system which is the part of autonomic nervous system exit from the spinal cord at the thoracic and lumbar regions which innervates the various organs involved in fight and flight response.

PITUITARY GLAND

The pituitary gland is called as master gland of endocrine system is a small organ that is located at the base of the brain just under the hypothalamus. The hormones released from the hypothalamus reaches the pituitary through the hypothalamo-hypophyseal tract. In response to hypothalamus and various level of circulating hormones the pituitary gland releases hormones to maintain the equilibrium. During stress response the pituitary gland release the adrenocorticotropic hormone which modulates the heavily regulated stress response system.

ADRENAL CORTICAL HORMONES

The hormones of the adrenal cortex are broadly classified as,

1. Mineralocorticoids which have a Predominant action on minerals (Na & K) and water balance and are secreted by the zona glomerulosa. Mineralocorticoids secreted are aldostrone and deoxycorticosterone. Aldosterone is physiologically more important because of its potent mineralocorticoid activity.

2. Glucocorticoids which have predominant action on carbohydrate and protein metabolism and are secreted by zona fasciculate. Glucocorticoids are cortisol and cortiosterone. The relative proportions vary with species. In humans cortisol is secreted in larger amounts than corticosterone. Cortisone which is not a natural secretion is more potent glucocorticoid than corticosterone but it is a metabolic product.

3. Sex hormones are mainly adrenal androgens secreted by the zona reticularis and zona fasciculata. Sex hormones are mainly dehydroepiandrosterone and some androstenedione. They are weakly androgenic .

ACTIONS OF CORTISOL

1.EFFECTS ON METABOLISM OF CARBOHYDRATES, PROTEINS, AND FAT.

Glucocorticoids increase the blood sugar level through (1) promoting neoglucogenesis in the liver, (2) hepatic glycogenesis – increasing the synthesis of glycogen in the liver, (3) decreasing the peripheral utilization of glucose through anti insulin effect but spares the glucose utilization by vital organs such heart, brain, so that the vitals organs have enough glucose for vital functions during stressful situations. (4) Glucocorticoids diminishes sensitivity of insulin, so that it aggravates the diabetes and prolonged administration of glucocorticoids in any form leads to adrenal diabetes.

Glucocorticoids produces antianabolic and catabolic effect on protein metabolism. It decreases the protein synthesis and increases the protein breakdown. The C terminal of aminoacid produced during protein breakdown is used gluconeogenesis. It decreases protein content in all the cell except the liver. Plasma aminoacid levels are increased due to protein catabolism. Excess cortisol causes increased urinary excretion of nitrogen which leads to negative nitrogen balance.

In fat metabolism the glucocorticoids causes mobilization and utilization of fat from adipose tissue the process called lipolysis and increases plasma lipid and ketone body formation. In the presence of insulin glucocorticoids increases the fat production in the liver. Excess cortisol leads to centripetal distribution of fat leads to obesity like external features.

PERMISSIVE ACTIONS

The presence of glucocorticoids required for the action of other hormones, so it has some permissive actions. The presence of cortisol is required for bronchodilator, vasoconstrictor, glycogenic, lipolytic and calorigenic actions of catecholamines and the gluconeogenetic and calorigenic effects of glucagon.

MAINTENANCE OF BLOOD PRESSURE

Though glucocorticoids have no direct action of blood vessels, they are essential for vasoconstrictor effect of noradrenaline. Hence in adrenal cortical insufficiency, blood pressure is low.

MUSCULAR EFFICIENCY

Cortisol in optimum amount is required for effective muscular contraction and relaxation. If present in low amount it produces profound muscular weakness and easy fatiguability. High amount of cortisol also produces muscular wasting and weakness.

RESISTANCE TO STRESS

Any stressful stimuli in the body induces pituitary to secrete ACTH which leads to secretion of cortisol from adrenal cortex to combat stress. Due to its permissive action it activates the other hormones like catecholamines and glucagon to combat stress.

ACTIONS ON BLOOD CELLS AND LYMPHOID TISSUES

The main action of cortisol on blood cells are eosinopenic, lympholytic and thymolytic. The cortisol reduces the number of circulating eosinophils and lymphocytes in peripheral blood. It also reduces the size of lymph node and causes atrophy of thymus. They also reduces the number of basophils but increases the amount of neutrophils, platelets and RBS's. Anemia due to chronic cortisol deficiency improves with glucocorticoid therapy. The eosinophil response to ACTH is used as a test of adrenal cortical function.

IMMUNOSUPPRESSIVE EFFECTS

Cortisol due to its lympholytic action it causes destruction of lymphocytes and inhibition of formation of lymphocytes and plasma cells. Glucocorticoids inhibits the formation of antibodies against the foreign and internal antigen. Because of its immunosuppressive action it is used in organ transplantation to avoid rejection in recipients. During stress the increased amount of cortisol suppresses the wound healing by immunosuppressive effect.

ANTI INFLAMMATORY ACTION

Cortisol reduces the inflammatory response to tissue injury and bacterial toxins. Inflammatory response are protective mechanism in our body to fight against foreign organism and effective wound healing. But cortisol reduces the inflammatory response in our body by inhibiting the release of mediators of inflammation such as prostaglandins, leukotrienes, bradykinins and various inflammatory mediators. It reduces the phagocytic activity of monocytes. It stabilizes the lysosomal membrane in lymphocytes and monocytes and inhibits the release of lysosomal enzymes in phagocytic vesicle.

It also reduces the release of endogenous pytogen such as interleukin-1 from macrophages and reduces fever. Glucocorticoids due to its anti inflammatory action it produces dramatic relief in acute inflammatory process, it is used with caution to prevent the systemic spread of bacteria in the body. This is particular so in tuberculosis in which the walling off of the lesion by connective tissue is affected.

ACTIONS ON CONNECTIVE TISSUE

Glucocorticoids reduces the fibroblastic activity and amount of fibrous tissue formed and softens excess fibrous tissue. Cortisol also decreases the formation of ground substances. This process is the basis for the use of steroids in the connective tissue disorders such as rheumatoid arthritis. When injected into the joint, it slows down the degrading effect of collagenase on joint tissues, so intra-articular injection of cortisol is given in some joint disorders.

ANTI-ALLERGIC ACTION

Glucocorticoids do not influence antigen-antibody combination or the effects of histamine once it is released. But they reduce the number of mast cells, inhibits intracellular synthesis of histamine and its release from the cell and possibly reduce the responsiveness of

tissues to histamine. So cortisol is used in allergic conditions, delayed hypersensitivity reactions and serum sickness. They also relax bronchial smooth muscles, reduce inflammatory changes and edema in bronchial mucosa, and are useful in relief of bronchial asthma.

ACTION ON GASTRIC SECRETIONS

Glucocorticoids increases the gastric acid and pepsin secretion. In case of stress excess amount of cortisol causes increased gastric output leads to formation of stress ulcers. Also exogenous use of steroids is avoided in peptic ulcer patients.

ACTIONS ON BONE

Glucocorticoids causes the osteoporosis by reduces the osteoblastic activity and bone formation, increases osteoclastic activity and bone destruction and reduces protein matrix in bone. It also causes hypocalcemia by increasing the urinary excretion of calcium and decreasing the calcium absorption from the gut.

ACTIONS ON KIDNEY

Glucocorticoids has mild mineralocorticoid effect on kidneys. It increases the glomerular filteration rate. In adrenal cortical insufficiency there is positive water balance due impaired ability excrete water load mainly due to reduced GFR.

REGULATION OF GLUCOCORTICOID SECRETIONS

Glucocorticoid secretion is under the control of anterior pituitary. For the development of adrenal cortex the adrenocorticotrophic hormone from anterior pituitary is essential, especially for the development of zona fasciculata and reticularis and for the secretion of glucocorticoids and adrenal androgens.

ACTH secretion from anterior pituitary is itself under the control of two mechanisms. (1) Free glucocorticoids in circulation causes negative feedback on anterior pituitary. High level of circulating free glucocorticoids causes decrease in ACTH secretion, and low level of glucorticoids causes reflex increase in ACTH secretion, thus optimum level of glucocorticoid maintained in circulation. (2) Hypothalamus which is superior controller of pituitary which secretes the corticotrophin releasing hormone secreted by neurosecretory cells which reaches the anterior pituitary via the hypophyseal portal circulation and increases the ACTH secretion. Stress, emotions and trauma acts on the hypothalamus and increases CRH release. The negative feedback acts both on pituitary and hypothalamus level.

NOREPINEPHRINE

Norepinephrine is a another major stress hormone secreted during acute or chronic stress. Norepinephrine is the hormone that causes the increase the heart rate, make glucose to be released from stores and increase the blood flow to the muscles during the stress response. Noradrenaline(norepinephrine) and adrenaline(epinephrine) are collectively called catecholamines which is secreted from adrenal medulla.

In fetal adrenal medulla contains only noradrenaline and there is no adrenaline. After birth only adrenaline appears and content slowly increase in the human body. Noradrenaline also released in the postganglionic sympathetic nerve endings and some enter the circulation.

During stress the increase in heart rate causes high blood pressure and stored glucose in liver and muscles released in to circulation leads to diabetes. Back and body muscle pain occurs during stress due to the tension in the muscle caused by the noradrenaline.

ACTIONS OF NORADRENALINE

The actions of adrenaline and noradrenaline are similar with some difference. Most of their actions resembles the effect of sympathetic stimulation.

ACTIONS ON CARDIOASCULAR SYSTEM

Adrenaline increases the heart rate and force and rate of contraction of cardiac muscle leads to increase in cardiac output and blood pressure. It causes constriction of cutaneous and splanchnic blood vessels except those of liver and dilates the skeletal muscular vessels, coronary vessels and those of liver. The net result is slight reduction in diastolic blood pressure due to slight reduction in peripheral resistance which leads to increase in pulse pressure.

Noradrenaline causes constriction of all blood vessels except coronary vessels. So net peripheral resistance is increased which leads to increase in systolic, diastolic and mean blood pressure. It causes reflex reduction in heart rate by stimulating the sinoaortic baroreceptors, so that mean cardiac output was decreased.

ACTIONS ON SMOOTH MUSCLES

Adrenaline and noradrenaline causes relaxations of smooth muscles of the stomach, intestines, urinary bladder, ureter, gall bladder, and constrict the sphincter of gastrointestinal tract. Thus over activation of sympathetic system causes reduced transit of GIT content leads to constipation and urinary retention. Adrenaline contracts the piloerector muscles of the skin. In non pregnant human uterus adrenaline causes contraction, while in late pregnancy it causes relaxation of uterine musculature.

ACTIONS ON SKELETAL MUSCLES

Adrenaline and noradrenaline increases the excitability and contractility of skeletal muscles and postpones the muscular fatigue and accelerates the recovery from fatigue. It increases the tone and tension developed in the muscular twitch. It increases the potassium entry in to the muscle which leads to fall in potassium level following transient increase due release from liver.

ACTION ON RESPIRATION

During stress to combat that adrenaline improves oxygenation by broncho dilatation and relieving bronchial spasm. It relieves

pulmonary congestion by pulmonary vasoconstriction. Net effect is increase in pulmonary ventilation. Initially there is apnea due to reflex effect of rise in blood pressure.

ACTIONS ON EYE

During flight and fight conditions it increases the range of vision by contracting the radial muscle fibres of the iris, it also causes retraction of upper eye lid muscles. It reduces the intraocular pressure by vasoconstriction and decreasing the aqueous humour formation.

ACTIONS ON CENTRAL NERVOUS SYSTEM

Adrenaline increases the general arousal and alerting by increasing the excitability of reticular activating system. It increases the ACTH release and inhibits the ADH release by acting on the hypothalamus.

FUNCTIONS OF ADRENAL MEDULLA DURING STRESS

In conditions of threatened danger and stressful emergencies causing fright, the adrenal medulla acts along with sympathetic nervous system to combat stress is referred to as the emergency function of the sympathoadrenal system.

The widespread sympathetic discharge releasing noradrenaline and increased adrenal medullary secretion of adrenaline and noradrenaline results in (1) Increased blood flow to the heart and skeletal muscles where they are required by increasing the cardiac output and blood pressure and redistributing the blood from cutaneous and sphlanchnic circulation to skeletal muscles by selective vasoconstriction. (2) It increases the oxygen supply by bronchodilatation and reducing the pulmonary congestion by pulmonary vasoconstriction. (3) It increases the supply of energy by mobilizing the glycogen and fatty acids from liver and muscles, fatty acids from adipose tissue and increasing the glucose and free fatty acids in blood for utilization.(4). The efficiency of skeletal muscle is increased by increasing the better contractility and postponing the fatigability of skeletal muscles.(5) Bleeding from major injuries are

reduced by vasoconstriction and hemostasis achieved by early clot formation by reducing the clotting time. (6) During stress the alertness is increased to combat stress by activating the reticular activating system located in the brain stem. (7) The pupils are dilated due to sympathetic activation which allows the more light to enter the eye in emergency situations to act efficiently.

METABOLISM OF CATECHOLAMINES

The half life of catecholamines in circulation is less than 2 minutes. The adrenal medullary catecholamines are inactivated in 2 stages by methylation and oxidative deamination. After metabolism in the liver cells the final end products are vanilyl mandelic acid and metanephrine are excreted through urine. The 24 hours urinary excretion of vanilyl mandelic acid was 6mg, and metanephrine is about 1.0mg and free hormone are about 25 to 50 ug of which noradrenaline forms about 80%.

AUTONOMIC NERVOUS SYSTEM

The autonomic nervous system is the primary mechanism in control of stress and fight or flight response to maintain the homeostasis in the body. The autonomic or visceral or vegetative nervous system acts at subconscious level innervates the internal organs and modulates and maintains the internal environment. The autonomic nervous system consist of (1) afferent autonomic nerves passes from the visceral receptors to the central nervous system.(2) The group of cells in the central nervous system at the different levels give rise to efferent autonomic nerves which innervates the viscera.

The autonomic nervous system has two divisions, the sympathetic nervous system and parasympathetic nervous system. The efferent path of the both sympathetic and parasympathetic nervous system has two neuron chains. They are pre ganglionic and postganglionic neurons. The pre ganglionic neurons are located in the central nervous system and the postganglionic neurons are located in the periphery.

The preganglionic neurons of sympathetic nervous system located in the thoracic and lumbar segment of the spinal cord. So sympathetic nervous system are called as thoracolumbar outflow. The post ganglionic neurons of sympathetic nervous system are located in paravertebral sympathetic chain parallel to and on either side of vertebral column.

The preganglionic neurons of parasympathetic nervous system are located in the certain cranial nerve nuclei(3,7,9,10) and sacral segment of spinal cord. So parasympathetic system is called craniosacral outflow. The post ganglionic neurons of parasympathetic nervous system are located near the target organs to which it supplies.

The preganglionic neurons of autonomic nervous system are myelinated B type of fibres which are fast conducting. The post ganglionic neurons of autonomic nervous system are unmyelinated C type of fibres which are slowly conducting than preganglionic fibres.

FUNCTIONS OF AUTONOMIC NERVOUS SYSTEM

Like central nervous system with its somatic nervous system undertaking quick actions based on external stimuli, the autonomic nervous system is designed for continuous neurovegetative action and control of internal viscera and its functions. In spite of control by central nervous system, the autonomic nervous system has certain independent function. In general the autonomic nervous system designed for controlling the involuntary activities in the human body like controlling the cardiac and smooth muscles, secretion of digestive, sweat glands and of the adrenal medulla and control the various autonomic process which happens beneath the level of consciousness.

It serves to combat forces acting from within or without which tends to alter circulatory, respiratory, excretory, temperature, glandular, regulatory and other visceral functions and restore the functions.

The sympathetic systemic mainly designed for the quick, immediate, massive action in conjugation with the adrenal medulla to combat condition like stress and flight fright response.

The sympathetico-adrenal axis comes into play in conditions of stress, emergencies, and threatened danger causing fright, flight, or flight. For quicker and massive action required during stress, the sympathetic nervous system have short preganglionic fibres as the sympathetic ganglions are located in the paravertebral region. The each preganglionic fibres arborizes with the multiple ganglion, to active the multiple organs and massive reaction required for combat stress with single command. The post ganglionic fibres are long in sympathetic nervous system, for widespread actions. During stress the automic nervous system are activated for controlling the cardiovascular, respiratory and glycolytic action to supply energy to necessary organs to combat stress.

In parasympathetic system there is long preganglionic fibres as ganglions are located more near the target organs. The each ganglion in parasympathetic system connects to only few number of post ganglionic fibres for little and more discrete actions. The parasympathetic system regulates the secretion of salivary, gastrointestinal, and other glands, the motor activity of GIT, urinary bladder smooth muscle activity and its action concerned with conservative and restorative process.

AUTONOMIC REFLEXES

The autonomic nervous system has afferent nerves fibres originating from end organs. The cell bodies of afferent fibres are located in posterior root ganglion or sensory ganglion of cranial nerves. The nerve roots arises from the receptors of visceral organs and travels to the centres of ANS. At the spinal cord level it leave the autonomic nerves and joins the spinal nerves and enters the spinal cord through posterior nerve root ganglion. Some of the sensory fibres carrying the pain travels through the ascending tract and reaches the thalamus. Other than sensory fibres carrying pain synapse with the lateral horn cells of thoracic and lumbar segments from which arise the efferent autonomic nerves.

In general the sympathetic afferents are concerned with mediation of pain sensation, while parasympathetic fibres are concerned with mediating the reflex actions.

CONTROL OF ANS ACTIVITY

Although the ANS functions in the independent manner, it is not completely free from central nervous system. The CNS controls in the ANS in various situations to maintain the steady state of equilibrium in the body. The posterior hypothalamus in the brain is the centre for control of sympathetic nervous system and stimulation of this region leads to widespread activation of sympathetic system. Though stimulation of anterior hypothalamus produces some parasympathetic activity, it is not a localized centre for controlling the parasympathetic system in the body.

The limbic system in the central nervous system has to and fro connection with the hypothalamus has influence on autonomic nervous system especially during the emotions and stressful situations. The cerebral cortex especially the frontal lobe has influence on autonomic nervous system in maintaining the equilibrium in the human body.

During the stress full conditions like fear, anxiety, the patient feels palpitation, sweating, distress, all due to activation of limbic system by the external stimuli which in turn activates the autonomic nervous system.

TRANSMISSIONS IN AUTONOMIC NERVOUS SYSTEM

Transmission in the synaptic ganglion was chemical in nature. The action which arrives at the synapse in the ganglion through the preganglionic fibres causes the release of acetylcholine which sets up the localized EPSP. On reaching the certain amount of threshold value it sets up the propagated action potential in the post synaptic neuron. These propagated nerve potential on reaching the nerve terminals which supplying the organ, a neurotransmitter is released which causes adequate action.

Acetylcholine is the neurotransmitter substance in (1) the ganglia of both sympathetic and parasympathetic nervous system. (2). Postganglionic terminals of all parasympathetic nerves. (3). Postganglionic sympathetic nerves supplying the sweat glands and sympathetic vasodilator nerves to skeletal muscles and probably heart.

Nor adrenaline is the transmitter in all the sympathetic nerves except those supplying the sweat glands and the sympathetic vasodilator nerves.

THE ROLE OF GLYCEMIC CONTROL IN WOUND HEALING

Diabetes mellitus is the disorder composed of various metabolic derangement with hyperglycemia which causes macrovascular, microvascular, and neuropathic changes. Diabetes often undiagnosed in many patients because it produces relatively early harmless symptoms like polyuria, polydipsia, and polyphagia.

Patients having diabetes often difficult to heal their wound when comparing normoglycemic individual. The initial barrier for wound healing was high blood sugar level which causes cell walls to become rigid, impair the flow of blood through the small vessel at the wound site and impending the red cell permeability. Impaired release of oxygen from hemoglobin at the wound site leads to nutrition and oxygen deficits at the wound site. Due to reduced blood flow cause reduced immunity at the wound site which increase the chance of infection and delayed wound healing. When the blood glucose is elevated for a long time the chemotaxis and phagocytosis of white blood cells are affected. The chemotaxis is the process of attracting the white blood cells to the site of infection or trauma, it is large affected in case of diabetes. The phagocytosis is the process of ingestion of

bacteria and other antigenic substance in to the white cells for intracellular destruction of micro organisms. The diabetic wound and wound of patients having poor glycemic control because of delayed macrophage introduction and diminished leukocyte migration leads to prolonged inflammatory process and poor immunity at wound site. In patient having diabetes the effective lean body mass is replaced by inactive fat which cause protein malnutrition which also contributes to the poor wound healing.

The increase in mortality and morbidity in diabetic patients is mainly due to the macrovascular, microvascular complications and due to poor wound healing. For all three categories of complications the patients care includes clinical evaluation of wound and general patient evaluation. This initial survey followed by local wound care which includes , offloading, debridement, dressing changes, and infection management and applicable adjuvant therapies.

In addition prolonged derangement in the glycemic control leads to atherosclerosis in the major vessels which impairs the blood flow to the peripheral organs which leads to poor wound healing. The impaired glycemic control also leads to neuropathy which is one of the factor for poor wound healing.

C REACTIVE PROTEIN

The C reactive protein are the annular pentameric protein which levels in blood plasma rises during acute phase reactions like inflammation. The C reactive protein are produced in liver which is increased following interleukin-6 secretion from macrophages and T cells. The main physiological role of C reactive protein is to bind to lysophosphatidylcholine expressed on the surface of dead or dying cells in order to activate the complement system via the C1Q complex.

The C reactive protein is a member of pentraxin family of proteins. It is not related to C peptide or protein C. It was the first pattern recognition receptor identified. The C reactive protein was so named because it first identified in serum of patients with inflammation which reacts with C polysaccharide of pneumococcus. The gene for CRP located on the chromosome 1. It contains 224 aminoacids has a monomer molecular and has an annular pentameric discoid shape. It is also non specific to any disease because its increased in all inflammatory reactions in the body due to various etiological factors.

FUNCTIONS OF C REACTIVE PROTEIN

C reactive produced from liver binds to the phosphocholine expressed on the surface bacteria, dead and dying cells. It makes the complement to binds to the complex and activate it for promoting phagocytosis by macrophages and neutrophils which clears bacteria, apoptotic cells and necrotic materials. The rise in CRP is acute phase response occurs as a result of rise in concentration of interleukins-6 which secreted by macrophages and adipocytes during the response to wide range of acute and chronic inflammatory conditions such as bacterial, viral, fungal infections, rheumatic and other inflammatory diseases. It plays a major role in innate immunity as a early defence mechanism against infection.

CRP rises within 2 hours of onset of inflammation. The peak rise in CRP is up to 50,000 fold and reaches maximum within 48 hours. Its half life is 18 hours and it is constant and therefore its level is determined by the rate of production and it indicates the severity of precipitating disease process. Thus CRP is act as a initial screening tool for an inflammation.

CLINICAL SIGNIFICANCE OF C REACTIVE PROTEIN

C reactive protein is mainly used as marker for acute phase reaction like inflammation, stress, etc.. Apart from liver failure there are only few causes which interfere with CRP production. The measurement and charting of CRP level are proven to be useful in monitoring the disease process and effectiveness of management. Immuno turbidimetry, ELISA, rapid immuno- diffusion and visual agglutination are all methods used to measure the CRP. A high sensitive CRP test measures the low levels of CRP using laser nephelometry. This high sensitive test gives result rapidly in 25 minutes with sensitivity up to 0.04mg/dl.

The normal concentration in healthy human serum is usually lower than 10 mg/l. The serum concentration of CRP slightly increase with aging. Higher levels of CRP is found mild infection, late pregnancy and viral infections. CRP is a more sensitive and accurate reflection of the acute phase reaction than compared to ESR. CRP elevated in mild inflammation may without elevation of ESR. In response to therapy the CRP returns to normal more rapidly than ESR.

SURGICAL WOUNDS

A wound is simply saying a break in the integrity of the tissues or skin which may be associated with disruption of the structure and function. Ulcer is disruption or break in the continuity of any lining may be skin, mucous membrane or others. Ulcer is one of the types of wounds**.** Based on Rank and Wakefield classification the wound is classified in to Tidy wounds and Untidy wounds.

The clean surgical wounds are classified under tidy wounds. Tidy wounds are the wounds caused by surgical incisions and uncontaminated wounds caused by sharp objects. The tidy wounds are usually is a clean, incised, healthy wounds without any tissue loss. For this type of tidy wounds, the primary suturing is done, the wound heals by primary intention with minimal scaring.

If clean incised surgical wound is infected by contamination of biliary content or content of the bowel during anastamosis, the tidy wound become untidy. This type of wound get infected, and wound gaping occurs in the post operative period. This type of wound requires suture removal, wound debridement and allow the wound for granulation tissue formation and heal by secondary intention.

WOUND HEALING

The wound healing is a complex process of achieving the anatomical and functional integrity of disrupted tissues by various components of blood cells like macrophages, neutrophils, lymphocytes, fibroblasts, and collagen in the organized and staged manner to achieve the effective wound healing.

TYPES OF WOUND HEALING

There are two types of wound healing, they are primary wound healing which means healing by first intention , secondary wound healing which means healing by secondary intention and third intention wound healing which means wound healing by delayed primary closure. There are various factors involved in wound healing by either primary, secondary and third intention like stress response to external stimuli, glycemic control, nutrition status of the individual etc…

PRIMARY HEALING

The primary healing occurs in the clean incised wound like surgical wounds and uncontaminated wound caused by sharp objects. In these wounds the wound edges are approximated with sutures. There is more epithelial regeneration than fibrosis. The wounds heals rapidly with short duration with complete closure. The scar formed by this wound is linear, smooth and supple.

SECONDARY HEALING

The secondary healing occurs in a wounds with extensive soft tissue loss like major trauma, burns, and wound with sepsis. Due to tissue loss, contamination and infection the wound takes longer time for healing and scar formation. These wounds heals slowly with large fibrosis. It leads to formation of wide scar, often hypertrophied and contracted scar. It may leads to certain amount of disability in involved organs. The re-epithelialisation occurs from remaining dermal elements or wound margins.

THIRD INTENTION

The wound healing by third intention is occur in highly contaminated wound which requires the wound debridement. For this

type of contaminated wound the wound debridement is essential to control infections. After controlling the infections by wound debridement and appropriate antibiotics, the wound is closed with sutures or covered with skin graft. The primary contaminated wounds and mixed tissue wounds heals by tertiary intention.

STAGES OF WOUND HEALING

1. Stage of inflammation.
2. Stage of granulation tissue formation and organization. Here due to fibroblastic activity synthesisation of collagen and ground substance occurs.
3. Stage of epithelialisation.
4. Stage of scar formation and resorption.
5. Stage of maturation.

PHASES OF WOUND HEALING

1. Inflammatory phase (lag or substrate or exudative phase)
2. Proliferative phase (collagen/fibroblastic phase)
3. Remodeling phase (maturation phase)

Vascular response ⇨ blood coagulation/thrombosis ⇨

Inflammation ⇨ new tissue formation ⇨

epithelialisation ⇨ Wound contracture ⇨

remodeling.

FACTORS AFFECTING WOUND HEALING

The wound healing is affected by certain factors in the human body and environment, which are categorized into the local and general factors.

1. LOCAL FACTORS

1. Infections
2. Presence of necrotic tissue and foreign body.
3. Poor blood supply
4. Venous or lymph stasis
5. Tissue tension
6. Haematoma

7. Large defect or poor apposition
8. Recurrent trauma
9. X-ray irradiated area
10. Site of wound – wounds over the joints and back has poor healing
11. Underlying disease like osteomyelitis and malignancy.
12. Mechanism and type of wound – incised/lacerated/crush/avulsion.
13. Tissue hypoxia locally reduces macrophages and fibroblast activity

2. GENERAL FACTORS

1. Age, obesity, smoking
2. Malnutrition, zinc, copper, manganese,
3. Vitamin deficiency (vit C and vit A)
4. Anemia
5. Malignancy
6. Uremia
7. Jaundice
8. Diabetes, metabolic disease
9. HIV and immunosuppressive diseases.

LAPAROSCOPIC SURGERY

Laparoscopic surgery is also called key hole surgery or minimally invasive surgery or band aid surgery is the evolving modern surgical technique. In more advanced technique the operations are even performed far from the location through small incisions using robotic instruments and high technologies.

The patient undergoing laparoscopic procedures have numerous advantages when compared to the conventional open procedures. The post operative pain and hemorrhage is reduced in laparoscopic procedure, when compared to the open procedure.

The important key element in the laparoscopic procedure is the use of a laparoscope, a long fibre optic cable system which allows viewing of the affected parts by snaking the cable from a more distant and easily accessible location.

There are two types of laparoscopic instruments are available. 1). A telescopic rod lens system, that is usually connected to a video camera. 2). A digital laparoscope where the charged coupled device is placed at the end of the laparoscope.

For illumination the laparoscope is connected to the cold light source(halogen or xenon) through fiber optic cable system which is inserted through a 5mm or 10mm cannula or trocar. For working space in operative field the abdomen is insufflated with carbon dioxide gas. This process elevates the diaphragm on both sides and reduces the lung volumes. So laparoscopic procedures are carried out only under general anesthesia, unlike the open procedure they are carried out under regional anesthesia. This is one of disadvantage in laparoscopic procedure when compared to open procedure. Carbon dioxide is used for insufflations, because it is common to human body, it can be absorbed by tissues and removed by respiratory system. Carbon dioxide gas is also non-inflammable, so electrosurgical instruments like diathermy is used safely without any fire blast. 5mm or 10mm camera is connected to the monitor is used to visualize the operating field with high clarity and required magnification by surgeon for bloodless surgery.

The laparoscopic procedure has numerous advantages to the patients, but for the surgeons it is difficult to learn. For the hospitals it requires capital amount of around 25 lakhs to implement the laparoscopy in the hospitals.

ADVANTAGES OF LAPAROSCOPIC PROCEDURES

The newly evolved laparoscopic procedures have number of advantages compared to conventional open procedures. They are

1. Laparoscopic procedure have reduced chance of hemorrhage than open procedure because of better magnification and wide working field which reduces the blood transfusion and post operative recovery time.
2. Multiple smaller incision is used in laparoscopic procedure which reduces the post operative pain and respiratory complications due to pain, and reduces the post operative recovery time and anxiety of the patient.
3. Less pain in post operative period leads to reduced requirement of analgesics and anxiolytics which reduces the systemic toxicity due to increased dose.
4. Although the procedure time in laparoscopy is longer when compared to conventional open procedure, the post operative recovery time is less, which makes the patient early return to the day to day activities.

5. In laparoscopic procedures the reduced exposure of internal organs to the external environment, so less chance of contamination and acquired infections.

6. During emergency situations we can do a diagnostic laparoscopy before the definitive procedure. When the diagnosis is in doubt , even modern imaging technique not able to pick the pathology, at that time we can use diagnostic laparoscopy as a tool to identify the pathology as well as therapeutic to avoid unnecessary laparotomy and ugly scar to the patient.

Although laparoscopy in adult age group is widely accepted, its advantage in pediatric age group was questioned. The benefits of laparoscopic procedure is recedes with younger age. Efficiency of laparoscopy is inferior to open procedures in certain conditions such as pyloromyotomy for infantile hypertrophic pyloric stenosis. Although the laparoscopic appendectomy has lesser wound damage when compared to open procedure, the laparoscopic approach is associated with more abscess formation than open procedure in emergency situations.

DISADVANTAGES OF LAPAROSCOPIC PROCEDURES

While laparoscopic procedure is clearly more advantageous than open procedure in terms of patient outcome, but it is difficult for the surgeon's perspective when compared to traditional open procedure.

1. The surgeon has the limited range of motion at the surgical site resulting in a loss of dexterity.

2. Due indirect view through the camera, the surgeon has poor depth perception when compared to open procedure.

3. In laparoscopic surgery, the surgeon uses various tools like laparoscope and various forceps to interact with tissues, rather than manipulating the tissues directly with hands as in open surgery. This disadvantage leads to inability of surgeon to judge how much force is required to dissect and manipulate tissues and vital structures, which causes damage to that structure and complications. Also due to this disadvantage the surgeon also lost the tactile sensations of the various tissues and organs, which is very useful in open

procedure to asses the extent of dissection especially in case of malignancy.

4. FULCRUM EFFECT – Due to fulcrum effect in laparoscopy, the tool end point moves in the opposite direction to the surgeon's hand, making laparoscopic procedure as a non-intuitive motor skills and difficult to learn by the surgeons.

5. Some surgeries, for example surgeries around carpel tunnel generally turn out to be better for the patient when the area can be opened up, allows the surgeon to see the whole picture, surrounding anatomical structures and physiology to better address the issue at the hand. In this regards key hole surgery can be a disadvantage.

6. In patient with preoperative morbidities like respiratory complications and cardiac complications, the patient is not fit for general anesthesia, which is required in case of laparoscopic procedures. But in these type of patients the open surgical procedure is carried out under regional anesthesia.

7. For the surgeons it is the newer technique and found difficulty in learning the laparoscopic principles and apply in the surgical field. For the hospital it requires some capital amount to establish and need trained staff to maintain the instruments.

RISKS IN LAPAROSCOPIC PROCEDURE

The most significant complication in laparoscopic procedure is from trocar injuries during insertion in to the abdominal cavity. Usually the trocar is inserted blindly in to the abdominal cavity, the injuries like abdominal wall hematoma, injury to visceral organs, umbilical hernia, umbilical wound infection, penetration of blood vessels or small or large bowel may be occur. This type of injuries occurs more commonly in patients having low body mass index or having history of prior abdominal surgeries. While these type of injuries are rare it leads to serious complications, primarily related to umbilical insertion site. Vascular injuries leads to hemorrhage and it is life threatening. Injuries to bowel leads to delayed peritonitis. So it is important to diagnose these injuries as early as possible to reduce the drastic complications.

During laparoscopic procedure the internal organs and tissues sustain the electrical burns unseen by the surgeons who working with electrodes due to leakage of current from faulty instrument in to the surrounding tissues. These electrical injuries may resulting in the perforated visceral organs which causes delayed peritonitis. This type of risk is eliminated by using active electrode monitoring.

During carbon dioxide insufflations in laparoscopic procedure there is risk of hypothermia and peritoneal trauma due increased exposure to cold and dry gas during insufflations. By using the surgical humidification therapy, which is use of humidified and heated carbon dioxide for insufflations shown to reduce the risk of hypothermia.

Many patients with preexisting pulmonary disorder may not tolerate the pneumoperitoneum (gas in the abdominal cavity) resulting in conversion of laparoscopic procedure in to the open procedure.

The carbon dioxide is introduced during creating pneumoperitoneum. All Co2 introduced is not removed through the surgical incisions. It remains in the peritoneum and elevates the diaphragm and irritates the phrenic nerve. It causes abdominal pain

radiating to shoulders. However this pain is transient the body absorbs the Co2 and eliminates it through the respiration.

Coagulation disorder and adhesions from previous abdominal surgeries poses additional risk for laparoscopic procedures. These are the relative contraindications for laparoscopic procedures.

Intra-abdominal adhesion formation is risk factor not only for laparoscopic procedure, it is also risk for open procedure. Adhesions are band like fibrous deposits that connects the tissues to organs post surgically. The risk of developing adhesions is about 50 t0 100% of all abdominal surgeries.

The adhesion formation probability in both laparoscopic and open procedures are same. Post operatively the complications of adhesion formation include, chronic pelvic pain, small bowel obstruction and female infertility. The significant complication causes major morbidity is small bowel obstruction.

These adhesion formation is reduced to certain extent by use of surgical humidification therapy. Other techniques used to prevent post operative adhesion formation is use of physical barrier such as flims or gels or use of broad coverage fluid agents to separate tissues during healing in post operative period.

OPEN SURGICAL PROCEDURES

Even though the new developed laparoscopic procedure have certain advantage to the patients and doctors, in certain aspects the conventional open surgical procedures have advantages over laparoscopic procedures.

ADVANTAGES

1. Surgeons have fair depth perceptions in the open surgical procedure, when compared to the laparoscopic procedures. In laparoscopic procedure the surgeon should orient the field according to the camera view and magnification. It is not needed in case of open surgery.
2. Surgeons directly feel the tissues with their hands. So surgeon able to know the texture and nature of tissue, so that he or she limits the dissection accurately up to certain point and avoid unnecessary confusions and complications. By use of tactile sensation surgeon asses the amount of force needed to dissect that particular tissues particularly in case of carcinomas.
3. In open surgical procedure the surgeons has wide range of motion when compared to the laparoscopic procedure.

DISADVANTAGES OF OPEN SURGICAL PROCEDURES

1. More hemorrhage in open procedure when compared to laparoscopic surgeries because of larger incisions and more tissue handling.

2. Larger incision made in the open procedure causes the more post operative pain compared to laparoscopic procedure. The increased pain in post operative period causes the respiratory distress and increase in stress level which leads to prolonged wound healing and recovery time.

3. Wide exposure of internal organs to the external environment causes more chance of infection in post operative period.

DATA ANALYSIS

DATA ANALYSIS

A prospective study was done in 100 patients undergoing surgery for Inguinal hernia, Symptomatic cholelithiasis, and Sub acute appendicitis. The study was conducted in the department of General Surgery, Govt Kilpauk Medical college and hospital for the period of six months from Jan 2015 to June 2015. The study group of 100 patients was divided in to 2 groups. Each group containing 50 patients.

The first group containing 50 patients undergoing conventional open surgical procedure and second group containing 50 patients undergoing minimally invasive laparoscopic procedure for Inguinal hernia, Symptomatic cholelithiasis, and Sub acute appendicitis.

The aim of our study is to determine the less stressful procedure among the conventional open surgery and minimally invasive laparoscopic procedure. The less stressful procedure have better wound healing with less chance of wound infection and early recovery post operatively. Stress hormonal variations during surgery causes post operative morbidity, wound infections , delayed recovery and prolonged hospital stay.

CONFOUNDING FACTORS AND RANDOMIZATION

1. AGE

The extremes of age that is old age individual and children have wide variation in stress response to various external and internal stimuli. So to prevent this confounding factors the middle aged adults which age limit between 18 years and 45 years are taken as study group.

2. DURATION OF SURGICAL PROCEDURE

The increased duration of surgical procedure leads to increased stress response and metabolic derangement which is cause for the post operative morbidity and mortality. So procedure with increased duration is the most stressful procedure. To randomize this confounding factor the duration of surgical procedure in open and laparoscopic procedure is taking as constant that is 2 hours.

3. COMPLICATIONS OF SURGERY

The surgery with known intra operative complications leads to increased handling of tissues leads to increase in stress response. To randomize this confounding factor, the patient undergoing surgical procedure was not included in the study group.

4. MEDICAL COMORBIDITIS

The patient with various medical comorbidity like diabetes mellitus, systemic hypertention, bronchial asthma, tuberculosis, epilepsy and psychiatric disorder have wide variation in stress response based on the severity of medical illness and external stimuli. To remove this confounding factor, the patient with this medical comorbidity are excluded from the study group.

5. DRUGS

The patient is on drugs for prolonged time like steroids for osteoarthritis modifies the stress response to various external stimuli. The patient with above said medical illness also on chronic drugs. To randomize this confounding factor the patient is on chronic drugs was not included in the study group.

6. VIRAL MARKERS

The patient positive for HIV, HbsAg, and Anti HCV, is usually on drugs and shows varying stress response to external stimuli. To remove this confounding factor the patient positive for this viral markers are not included in the study.

PROCEDURES

TABLE 1

S.NO	CLINICAL DIAGNOSIS	NUMBER OF PATIENTS
1.	Inguinal hernia	15
2.	Symptomatic cholelithiasis	36
3.	Sub acute appendicitis	49

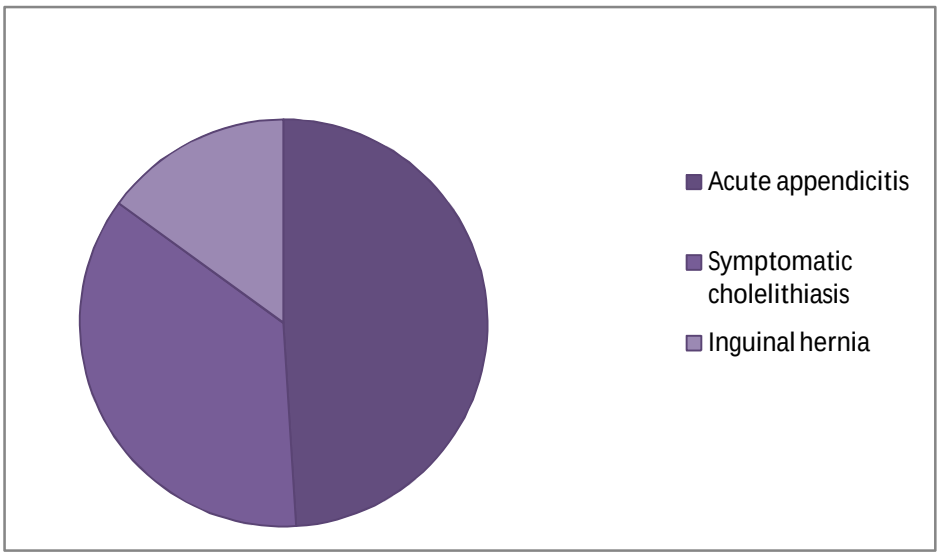
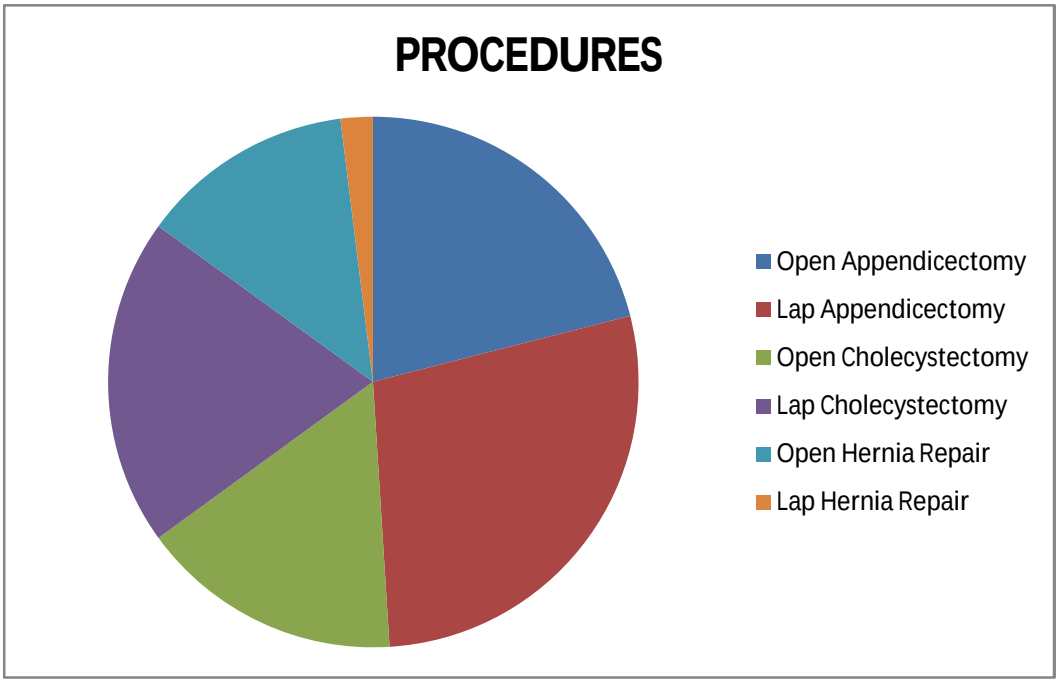


TABLE 2

S.NO	PROCEDURE DONE	NUMBER OF PATIENTS
1.	Open Appendicectomy	21
2.	Lap Appendicectomy	28
3.	Open Cholecystectomy	16
4.	Lap Cholecystectomy	20
5.	Open Hernia Repair	13
6.	Lap Hernia Repair	2

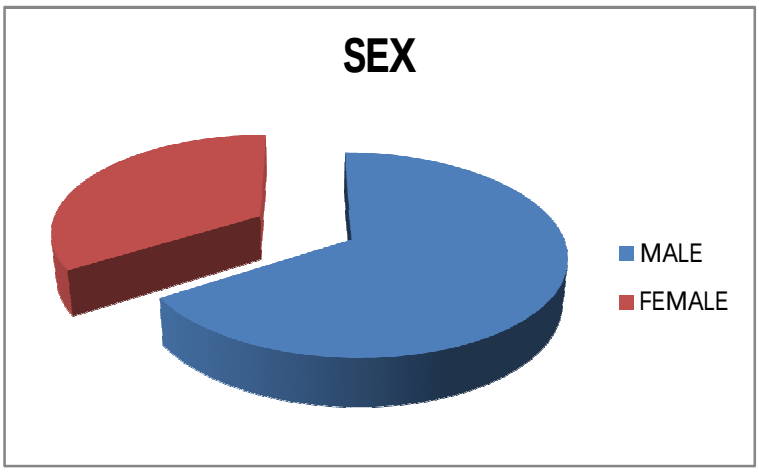


SEX DISTRIBUTION

TABLE 3

S.NO	PROCEDURES	MALE	FEMALE
1.	Open Surgical Procedure	33	17
2.	Laparoscopic procedure	28	22

OPEN SURGICAL PROCEDURE



LAPAROSCOPIC PROCEDURE

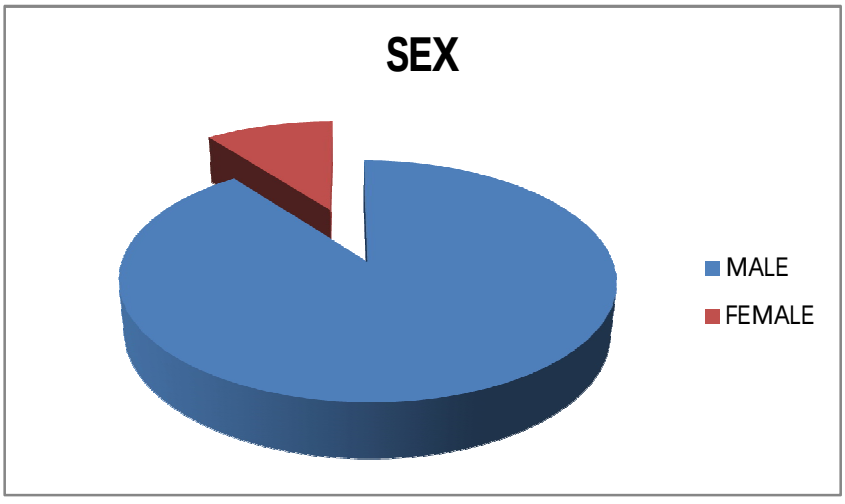


TABLE 4

S.NO	PROCEDURE	TOTAL	MALE	FEMALE
1.	Open Appendicectomy	21	12	9
2.	Lap Appendicectomy	28	16	12
3.	Open Cholecystectomy	16	8	8
4.	Lap Cholecystectomy	20	10	10
5.	Open Hernia Repair	13	13	0
6.	Lap Hernia Repair	2	2	0

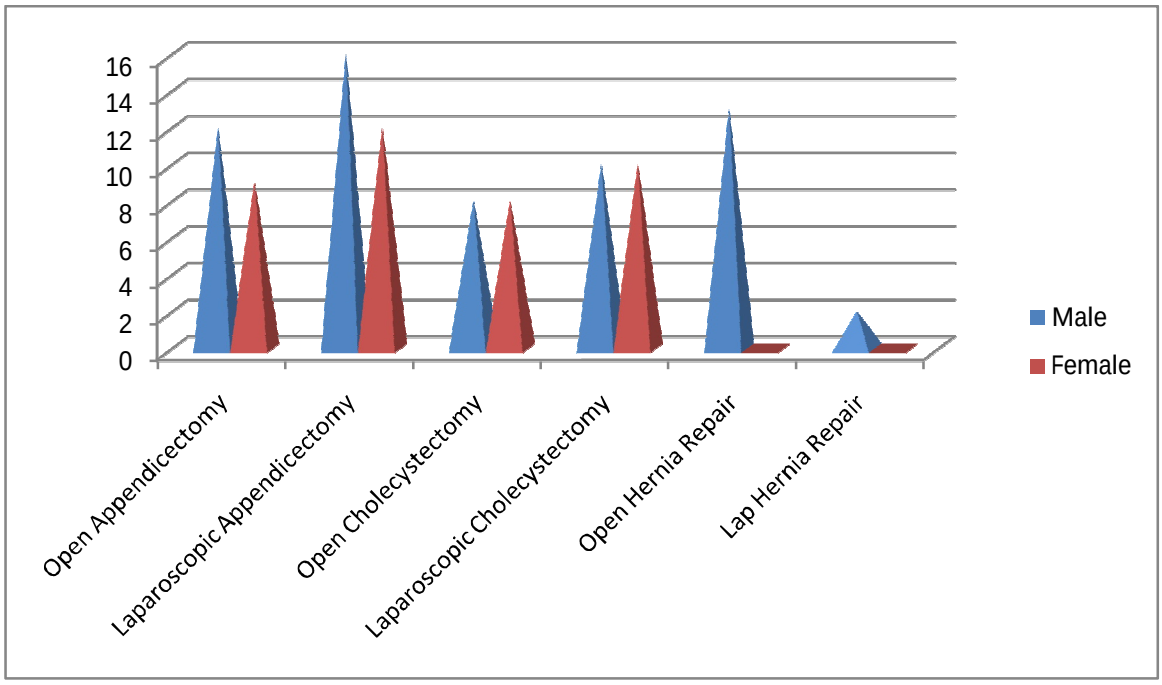


TABLE 5

S.NO	PROCEDURE	TOTAL	AGE 18 – 30 YRS	AGE 31 – 45 YRS
1.	Open Appendicectomy	21	10	11
2.	Lap Appendicectomy	28	11	17
3.	Open Cholecystectomy	16	3	13
4.	Lap Cholecystectomy	20	4	16
5.	Open Hernia Repair	13	1	12
6.	Lap Hernia Repair	2	1	1

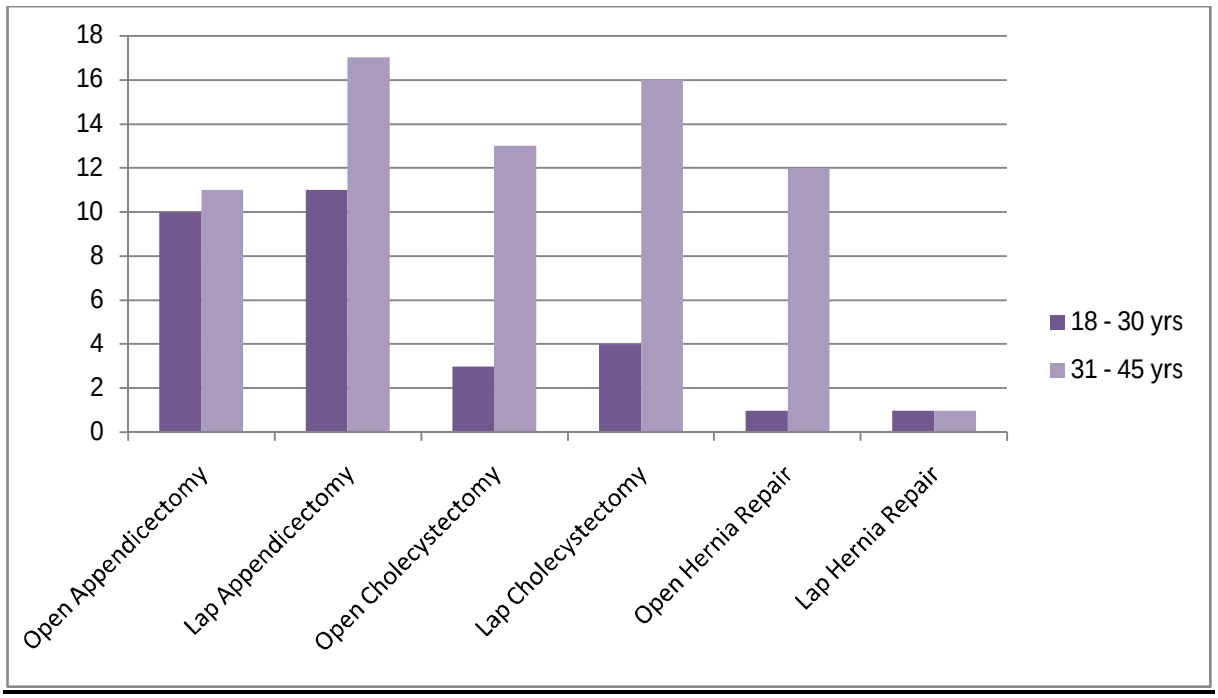
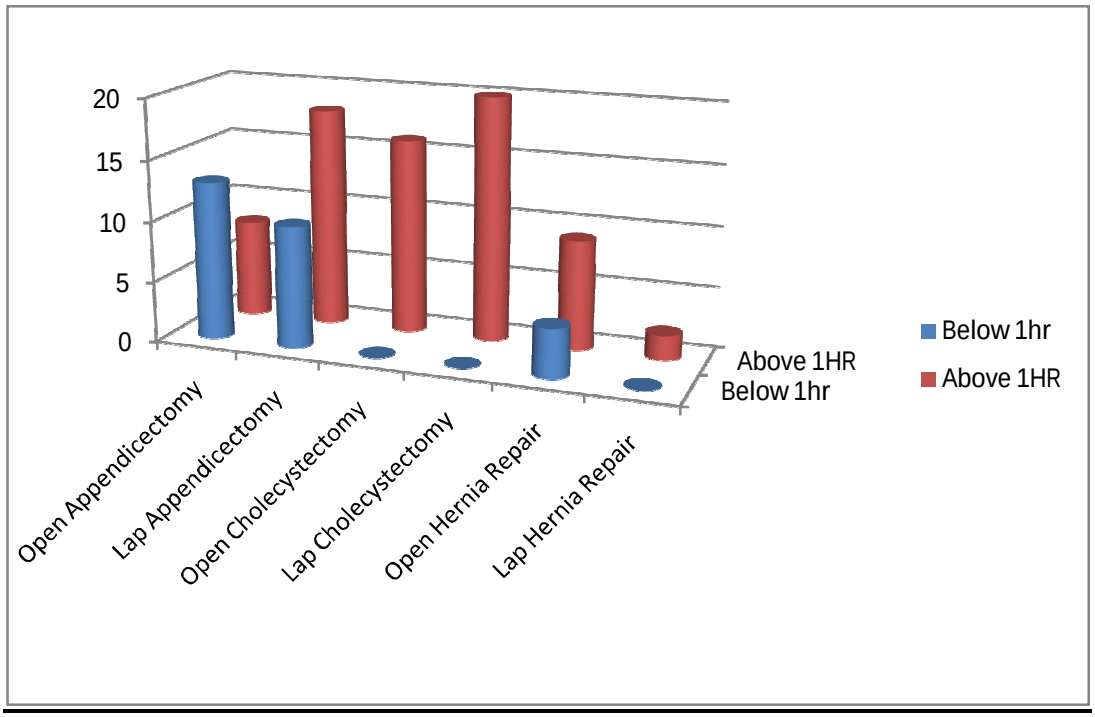


TABLE 6

PROCEDURE TIME

S.NO	PROCEDURE	TOTAL	BELOW 1 HR	ABOVE 1HR
1.	Open Appendicectomy	21	13	8
2.	Lap Appendicectomy	28	10	18
3.	Open Cholecystectomy	16	0	16
4.	Lap Cholecystectomy	20	0	20
5.	Open Hernia Repair	13	4	9
6.	Lap Hernia Repair	2	0	2

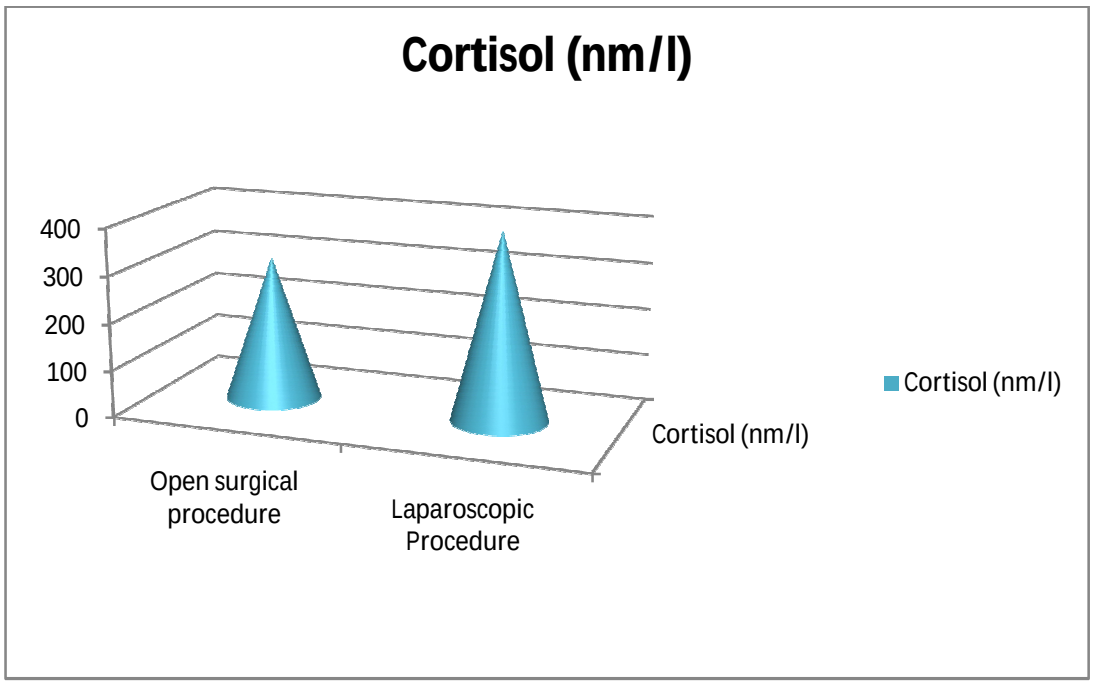


COMPARISON OF PRE-OPERATIVE CORTISOL LEVELS AMONG THE STUDY GROUPS

TABLE 7

Surgical Procedures	Preoperative cortisol		T test	P value
	Mean	S.E.		
Open abdomen procedures	305.80	11.6	-5.541	0.001
Lap procedure	399.52	12.3		

MEAN PRE- OPERATIVE CORTISOL LEVEL

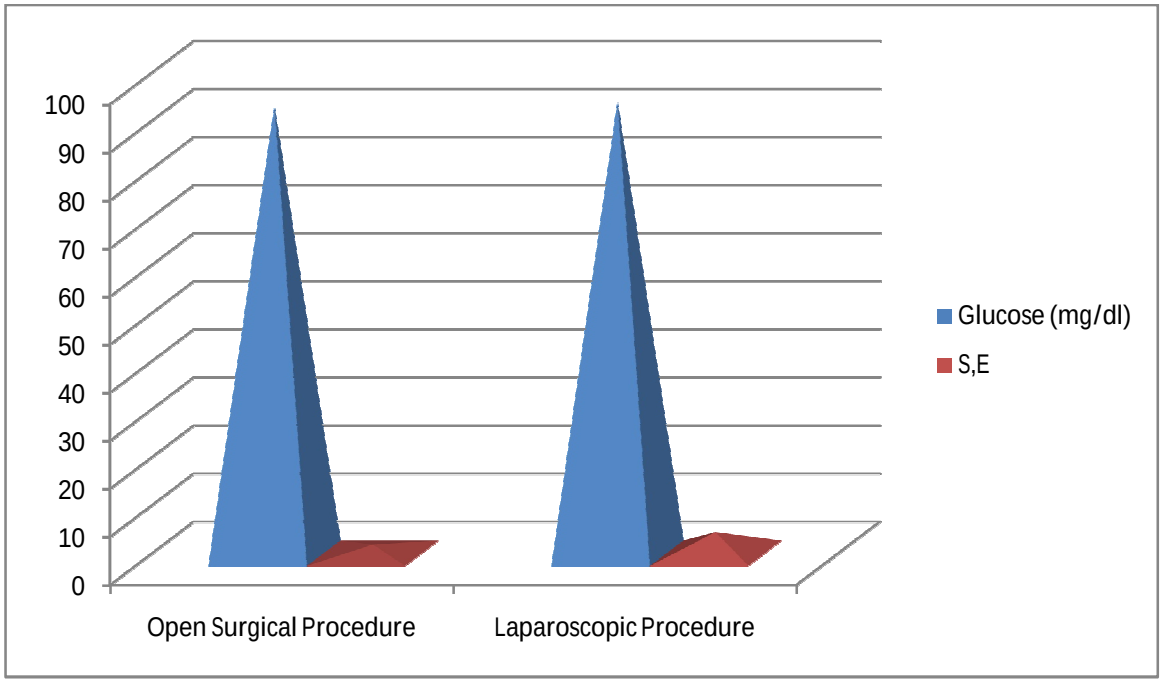


COMPARISON OF PRE-OPERATIVE GLUCOSE LEVELS AMONG THE STUDY GROUPS

TABLE 8

Surgical Procedures	Pre-operative Glucose		T test	P value
	Mean	S.E.		
Open Surgical procedures	92.84	1.8	-0.388	0.699
Laparoscopic procedure	93.72	1.4		

MEAN PRE- OPERATIVE GLUCOSE LEVEL



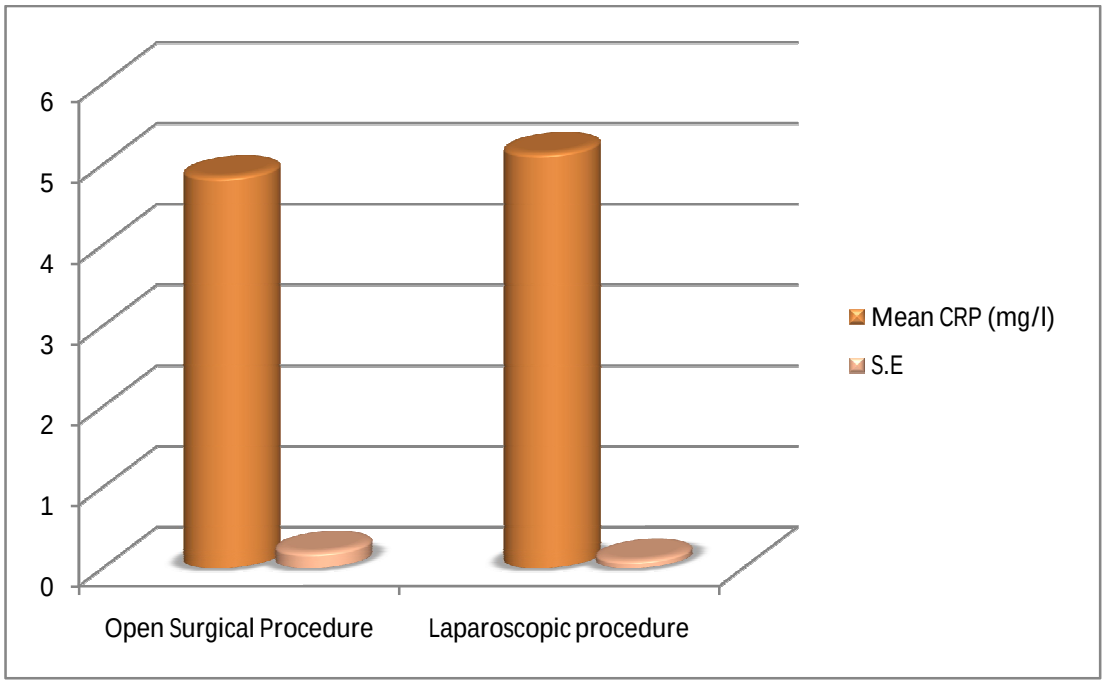
COMPARISON OF PRE-OPERATIVE CRP LEVELS

AMONG THE STUDY GROUPS

TABLE 9

Procedure	Pre-operative CRP		T test	P value
	Mean	S.E.		
Open Surgical procedures	4.85	0.2	-1.186	0.238
Laparoscopic procedures	5.14	0.1		

MEAN PRE OPERATIVE CRP LEVEL

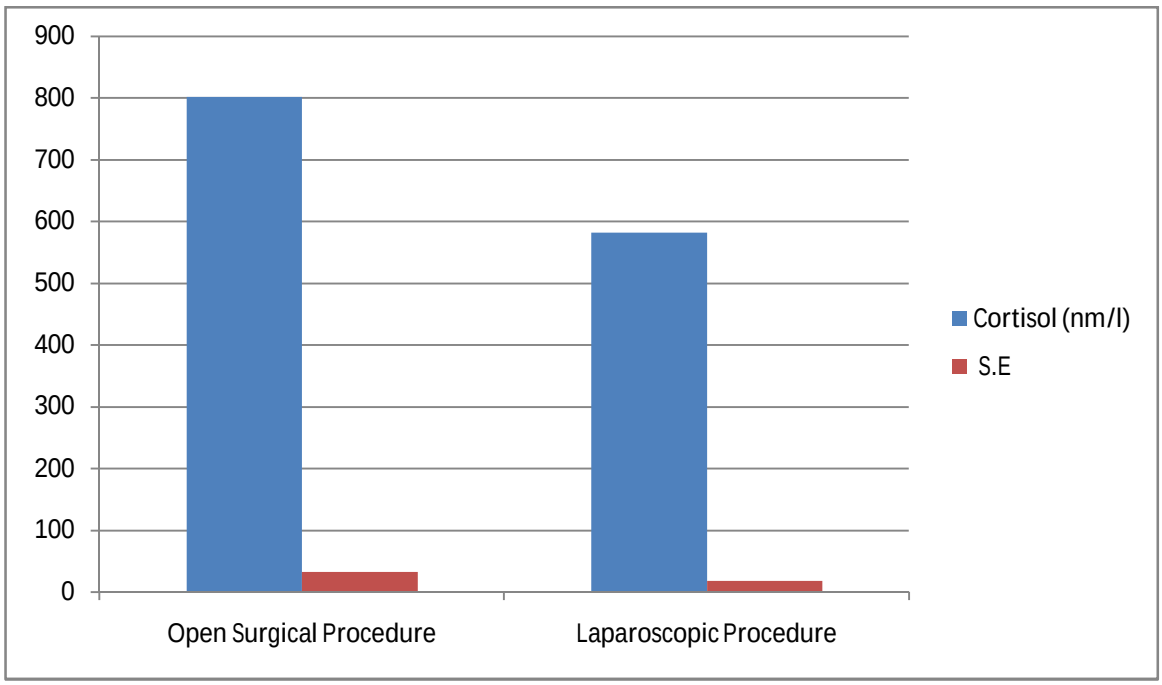


COMPARISON OF POST-OPERATIVE CORTISOL LEVELS AMONG THE STUDY GROUPS

TABLE 10

Procedure	Post-operative cortisol		T test	P value
	Mean	S.E.		
Open Surgical procedures	801.60	33.5	5.697	0.0001
Laparoscopic procedures	581.76	19.1		

POST OPERATIVE MEAN CORTISOL LEVEL

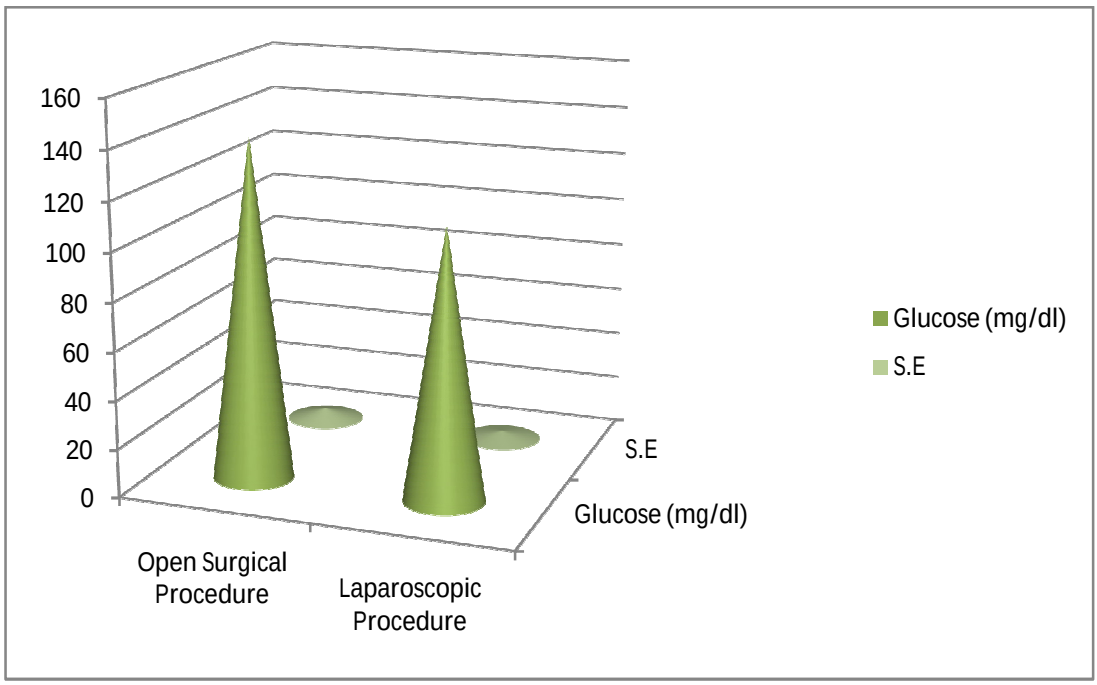


COMPARISON OF POST-OPERATIVE GLUCOSE LEVELS AMONG THE STUDY GROUPS

TABLE 11

Procedure	Post-operative Glucose		T test	P value
	Mean	S.E.		
Open Surgical procedures	140.18	4.3	5.523	0.0001
Laparoscopic procedure	111.00	3.1		

POST OPERATIVE MEAN GLUCOSE LEVEL



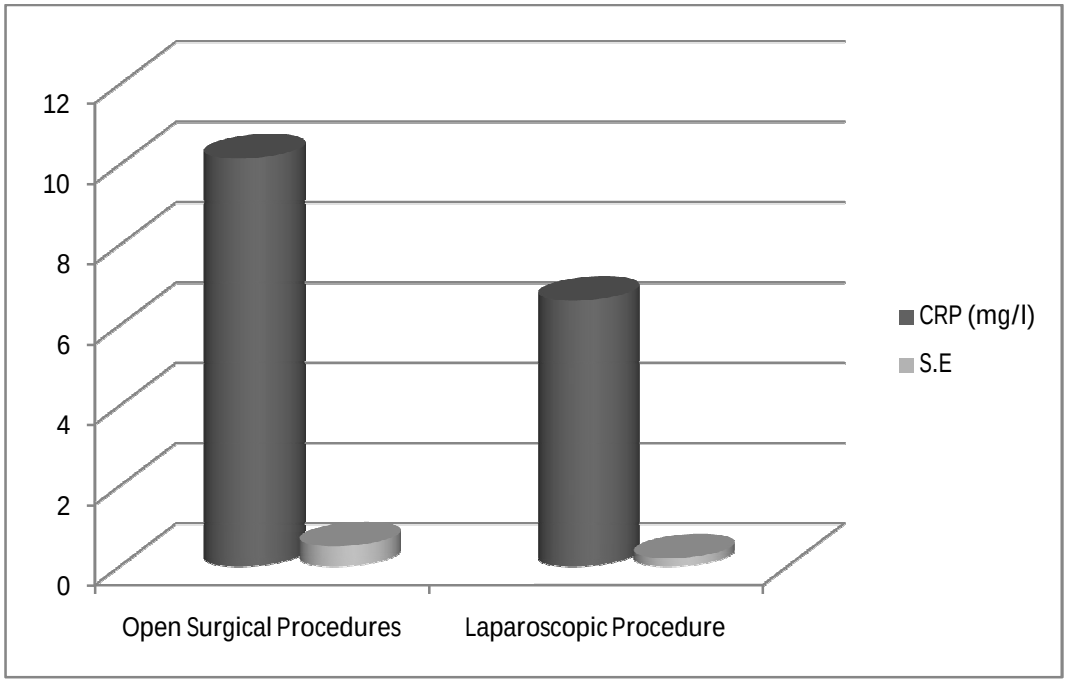
COMPARISON OF POST-OPERATIVE CRP LEVELS

AMONG THE STUDY GROUPS

TABLE 12

Procedure	Post-operative CRP		T test	P value
	Mean	S.E.		
Open Surgical procedures	10.16	0.5	6.477	0.0001
Laparoscopic procedure	6.62	0.2		

POST OPERATIVE MEAN CRP LEVEL



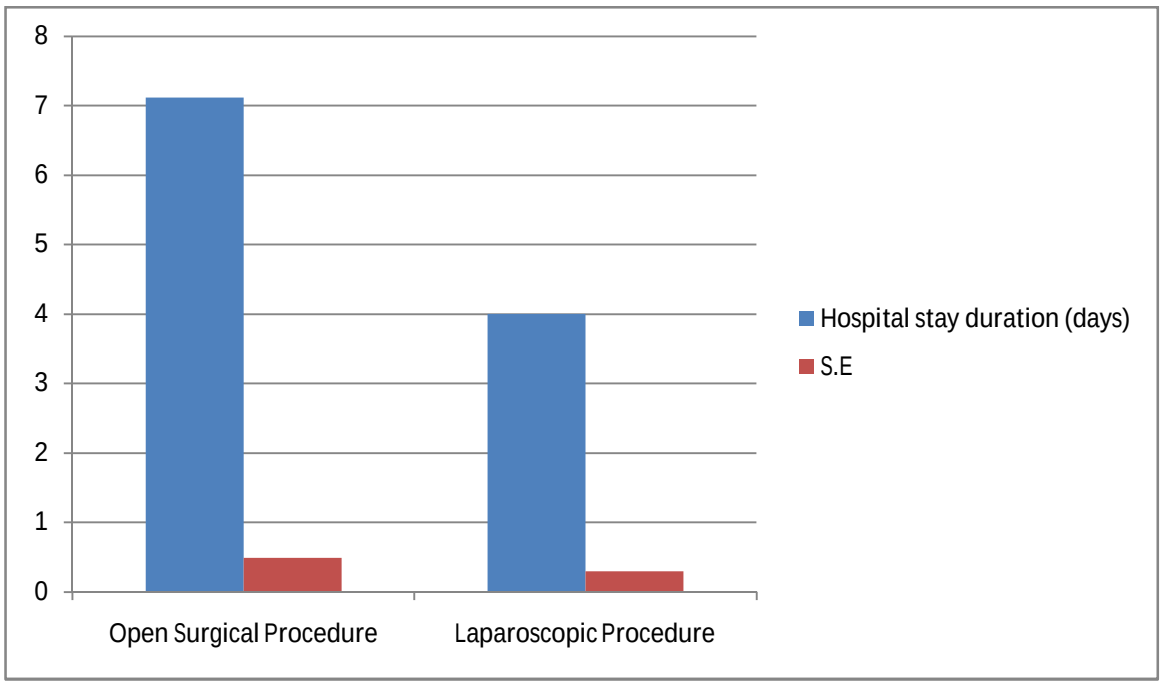
COMPARISON OF DURATION OF HOSPITAL STAY

AMONG THE STUDY GROUPS

TABLE 13

Procedure	Hospital stay duration		T test	P value
	Mean	S.E.		
Open Surgical procedures	7.12	0.5	5.337	0.0001
Laparoscopic procedures	4.00	0.3		

MEAN DURATION OF HOSPITAL STAY

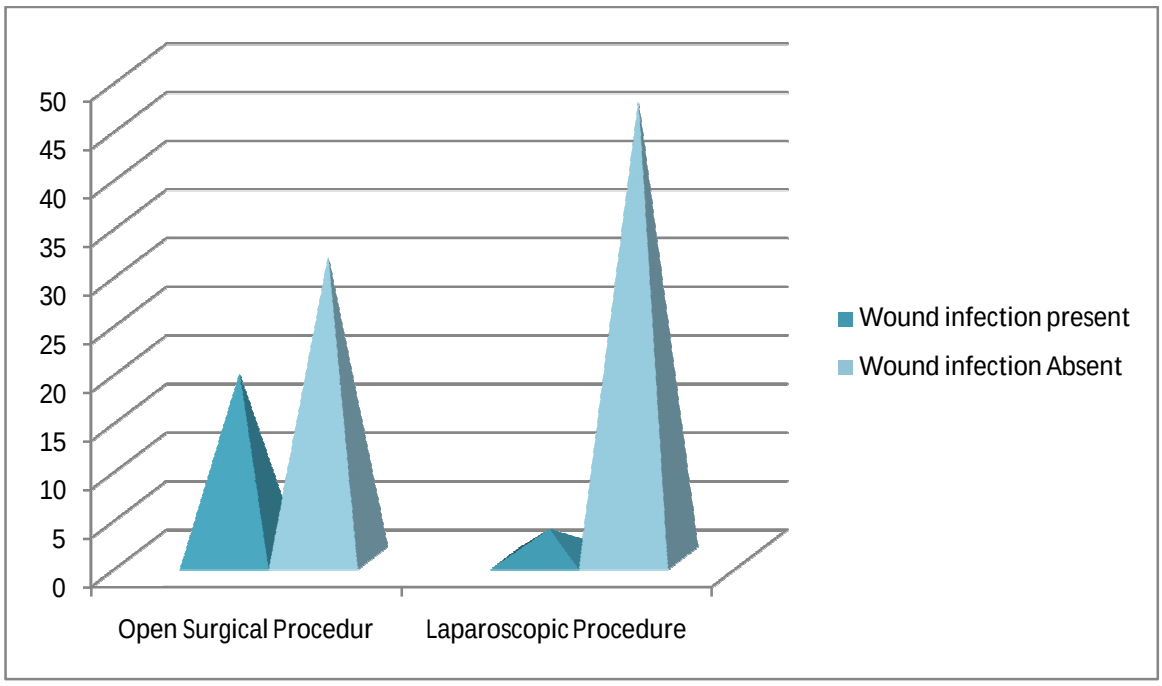


COMPARISON OF POST-OPERATIVE WOUND INFECTION AMONG THE STUDY GROUPS

TABLE 14

Procedure	Post-operative wound infection		Chisquare test	P value
	Present	Absent		
Open Surgical procedures	19	31	14.92	0.0001
Laparoscopic procedures	3	47		

POST OPERATIVE WOUND INFECTION



DISCUSSION

DISCUSSION

In our prospective study of stress response in open and laparoscopic procedure, 100 patients are included in study group. There is male preponderance in the study group. Out of 100 patient 61 patients were male and remaining 39 patients are female. In open surgery study group 33 patients were male and 17 patients were female. In laparoscopic procedure study group 28 patients were male and 22 patients were female.

In our study 3 different cases were included. Out of that the case of sub acute appendicitis predominates the other. There are 49 cases of subacute appendicitis was included in the study. A case of inguinal hernia holds the minimum number of 15 patients.

To avoid the wide variation of stress response in extremes of age, in our study I included middle aged patients between the age group of 18 and 45 years. Most of the patients fall under the category of above 30 yrs of age. Out of 100 patients 70 patients are above 30 yrs and 30 patients are below 30 years.

To avoid stress response due to variation in duration of surgery , the duration of surgery in our study kept as constant. That is the

patients undergoing surgery with procedure time less that 2 hrs are included in our study. Most of the patients fall under the category of surgical procedure duration more than 1 hr. 73 patients are undergoing procedure with duration more than 1 hr and 27 patients are undergoing procedure duration less than 1 hr.

To measure the pre operative basal level of cortisol, glucose and CRP was measured by collecting the blood sample from the patients included in the study group at the time of hospital admission.

The mean pre operative cortisol was found to be 305.80 nm/l and in laparoscopic group it was found to be 399.52 nm/l. By comparing the pre operative cortisol level between two groups we found that the mean cortisol level in laparoscopic group was found to be found to higher than the laparoscopic group. The difference is statistically significant , it has the P value of 0.001 (less than 0.05). Even though the pre operative mean cortisol level shows statistically significant difference, the difference may be due day night variation of cortisol level.

The mean post operative rise in cortisol was found to be higher in laparoscopic group. The mean post operative cortisol level in open surgical group was found to be 801.60nm/l and in laparoscopic group

it was found to be 581.76. when compared to pre operative cortisol level the post operative cortisol in laparoscopic group was much less compared to open group. The change in cortisol level is also statistically different, with the P value of o.ooo1 (less than 0.005).

The mean pre operative serum glucose level in open surgery was 92.84 mgldl and in laparoscopic group was 93.72 . By comparing these pre operative mean glucose level there is not much difference. The difference is also statistically not significant with P value of 0.699. (not less than 0.05).

The mean post operative serum glucose level in open surgical group was 140.18mg/dl and in laparoscopic group was 111mg/dl . The laparoscopic group has less rise in serum glucose when compared to open surgical group. It is also statistically significant with P value of 0.0001 (p value less than 0.05).

The mean level of pre operative CRP level in open group was 4.85mg/l and in laparoscopic group was 5.14 mg/dl. The pre operative difference mean CRP between two groups was statistically insignificant with P value of 0.238 (not less than 0.05)

The mean level of post operative CRP level in open group was 10.16 mg/dl and in laparoscopic group was 6.62mg/dl. The post operative the mean CRP level in laparoscopic surgical group has drastically less than the open surgical group. The post operative difference in mean CRP level is statistically different with the P value of 0.0001 (P value less than 0.005).

The signs of post operative surgical site infection is also less in laparoscopic surgical group, when compared to the open surgical group. Out of 50 patients in open surgical group 19 patients have surgical site infection. But in laparoscopic group out of 50 patients only 3 patients has surgical site infection. The difference between two groups was statistically significant with the P value of 0.0001.(less than 0.05).

The duration of hospital stay in the post operative period also less in laparoscopic group when compared to open surgical group. The mean duration of hospital stay in open surgical group was 7.12 days and in laparoscopic group was 4 days. The difference is statistically significant with the P value of 0.0001(less than 0.05).

Surgery is associated with metabolic and endocrine responses characterized by hyper glycemia, increase in ACTH, cortisol, prolactin, ADH, and a decrease in insulin. When human is exposed to any of an immense variety of noxious or potentially noxious stimuli, there is an increased secretion of ACTH and consequently a rise in the circulatory glucocorticoids levels. This rise is essential for survival. In a study by Kehlet H. et al [2] found that T3 level fall after surgery in young patients while T4 level did not change significantly with time. In their study T3 level did not rise following surgery in both laparoscopic as well as open surgery. There was a slight increase in T4 and TSH level following surgery in both the groups In human prolactin secretion is increased by exercise, surgical and psychological stress and stimulation of nipple. The plasma prolactin level rises during sleep, the rise starting after the onset of the Sleep and persistant through out whole period of sleep.

Bozkurt P et al [1] comparing metabolic and endocrine response to laparoscopic versus open surgery in pediatric age groups, compared stress response during operations for abdominal pain performed via laparoscopy or open surgery in children [n=29] and found that prolactin level increased after surgery in both laparoscopic as well as

open surgery. Rise was however 1.6-2.0 times following surgery, while in contrast to that in our study prolactin level did not rise after surgery in both the groups and in fact it fell after surgery. This is most likely due to pulsatile release of prolactin or due to single sample collection in their study.

Bozkurt [1] also noticed raised cortisol level after surgery in both laparoscopic as well as open surgery. Rise was around 1.01.2 times following surgery. We also noticed high levels of cortisol after surgery in both laparoscopic as well as open surgery and the rise was around 1.2-1.9 times. The rise in glucose level was there in laparoscopic as well as open surgery; however, rise after open surgery was more than after laparoscopic surgery. After laparoscopic surgery it was around 1.2 times, while in open surgery it was around 1.4 times. Insulin level rise was 1.7 times following surgery in study conducted by Bozkurt while in our study rise was 2.0 times following surgery. Thus the metabolic response to stress in children was comparable to other in literature except prolactin response

Makir GG et al [3] studied 41 patients of adult group undergoing laparoscopic cholecystectomy and 42 patients undergoing open cholecystectomy found that plasma levels of cortisol and

catecholamines increased during and after both lapaparoscopic and open cholecystectomy. However the post operative responses were significantly higher after open cholecystectomy group. Glucose and CRP level also increased after operation and were significantly higher in open cholecystectomy group. Similarly Haque Z et al [4] compared stress response between laparoscopic and open cholecystectomy and found that cortisol, glucose increased in postoperative period in open cholecystectomy then in laparoscopic cholecystectomy. In our study in children cortisol and glucose level also increased after surgery. The cortisol level increased 1.9 times in open surgery and 1.2 times following laparoscopic surgery. Glucose level also increased following surgery, being 1.4 times in open surgery and 1.2times following laparoscopic surgery. CRP level preoperatively were negative while Fig 7ab - TSH level rise was 1-1.2 times following open and laparoscopic surgery following surgery it became positive. This signifies that children behave in similar fashion as adults to stress.

Schauer PR. et al [5] found that plasma concentration of glucose and cortisol increased after surgery (cortisol level increased 1.9 times in open surgery and 1.2 times following lap surgery) in both the

groups, being more in open surgery then in lap surgery, which was comparable to our study. Muzii L. et al [6] found that cortisol and prolactin level were high after open cholecystectomy as compared to lap cholecystectomy, while in our study although, cortisol level increased after surgery but prolactin decreased after surgery. This could be related to pulsatile release of prolactin. Also, it could be due to absence of mass pooling. Akhtar K et al [7] compared metabolic and inflammatory responses after laparoscopic and open inguinal hernia repair. They studied 10 patients in each group and found that cortisol level increased in both groups with open hernia repair having a higher acute phase response, similar to response seen in children. H.Kehlet [2] studied influence of age on endocrine metabolic response to surgery. He found that plasma cortisol concentration increased from a basal mean level in young subjects, serum T4 did not change significantly with time, the T3 level fell after surgery and plasma insulin level raised after surgery. While we noticed slight increase in level of T4 following surgery and a decrease in level of T3 following surgery. Significant elevations of both ACTH and cortisol were noticed after surgery in laparoscopic as well as open surgery by Mansour et al [8].

CONCLUSION

CONCLUSION

In our prospective study of 100 patients , by comparing the stress response in open surgical and laparoscopic group, the laparoscopic group shows the less stress response to surgery among two groups. The patients undergone laparoscopic surgery also shows the less change of surgical site wound infection and early fast recovery post operatively when compared to the open surgical group.

By comparing the pre operative level of cortisol, CRP and glucose in open surgical and laparoscopic group there is not much difference between the two groups. The pre operative P value for the cortisol, glucose and CRP are not less than 0.05. It indicates there is no statistically significant difference between the two groups pre operatively.

By comparing the post operative level of serum cortisol , CRP and glucose , the laparoscopic group has much less stress response compared to open surgical group with P value less than 0.05.

From our study I conclude that the recently advanced laparoscopic surgical procedure was best procedure with less stress, less pain, less anxiety, early recovery from hospital stay and economic to the patients.

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BIBLIOGRAPHY

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PROFORMA

Name : Age/sex :

IP NO: DOA: DOD:

Address :

Occupation :

Presenting Complaints :

Past History:

Previous history of surgeries:

Comorbidity:

DM / SHT / ASTHMA / TUBERCULOSIS / EPILEPSY /

PSYCHIATRIC ILLNESS

Personal History

Alcohol Consumption

Smoking I V drug abuse

DIAGNOSIS

Pre operative lab values

1. Serum cortisol –
2. Serum glucose –
3. CRP –

Surgical procedure done :-

Duration of surgery :

Intra operative complications

Post operative lab values (6 hours after surgery)

1. Serum cortisol :
2. Serum glucose :
3. CRP –

Signs of wound infection :

Duration of hospital stay :

MASTER CHART															
S.NO	Name	Age/Sex	IP No	Diagnosis	Procedure done	Duration of Surgery	Complications of Surgery	Pre Operative Lab values			Post Operative Lab Values			Signs of Wound infection	Duration of Hospital Stay
								S.Cortisol(nm/l)	S.Glucose(mg/dl)	CRP(mg/l)	S.Cortisol(nm/l)	S.Glucose(mg/dl)	CRP(mg/l)		
1	Arjunan	25/M	12565	Subacute appendicitis	Open appendicectomy	45 min	NIL	435	90	6	840	150	12	NIL	5 days
2	Kalai Selvi	30/F	13675	Subacute appendicitis	Open appendicectomy	55 min	NIL	246	86	4	730	140	8	NIL	4 days
3	Karunakaran	43/M	14321	Symptomatic cholelithiasis	Open cholecystectomy	1hr 30 min	NIL	535	76	7	1025	156	12	NIL	6 days
4	Sekar	40/M	10298	Rt inguinal hernia	Open hernia repair	1hr15min	NIL	250	85	8.5	750	110	11	NIL	7 days
5	Raja	30/M	12456	Symptomatic cholelithiasis	Open cholecystectomy	1hr35min	NIL	345	78	4.7	987	120	12	NIL	6 days
6	Kumarappan	36/M	11678	Lt inguinal hernia	Open hernia repair	1hr 5min	NIL	346	96	8.5	735	130	9.5	NIL	4 days
7	Santhi	39/F	12356	Symptomatic cholelithiasis	Open cholecystectomy	1hr 45min	NIL	246	79	4.5	956	156	15	Present	10 days
8	Kamalamal	43/F	13476	Subacute appendicitis	Open appendicectomy	1hr 05min	NIL	346	80	6	923	146	11.3	Present	7 days
9	Chandhini	24/F	13245	Subacute appendicitis	Open appendicectomy	55 min	NIL	135	115	3.5	535	130	6.5	NIL	3 days

10	Govindammal	34/F	12465	Symptomatic cholelithiasis	Open cholecystectomy	1hr 50min	NIL	346	95	6.5	1056	183	12.5	Present	9 days
11	Krishnan	38/M	15678	Lt inguinal hernia	Open hernia repair	1 hr 15min	NIL	246	79	4.5	646	105	7.5	NIL	3 days
12	Balakumar	35/M	14567	Symptomatic cholelithiasis	Open cholecystectomy	1hr 30min	NIL	348	89	5.8	987	176	13.9	Present	11 days
13	Aravind	42/M	12786	Subacute appendicitis	Open appendicectomy	1hr 10min	NIL	249	110	6.5	946	178	11.6	Present	8 days
14	Vasanth	23/M	16785	Subacute appendicitis	Open appendicectomy	45 min	NIL	239	78	4.9	567	110	6.5	NIL	3 days
15	Murugan	36/M	23465	Lt inguinal hernia	Open hernia repair	1hr 20 min	NIL	346	98	5.1	745	115	9.5	NIL	6 days
16	Kuppammal	36/F	12564	Symptomatic cholelithiasis	Open cholecystectomy	1hr 05min	NIL	265	97	6.6	564	128	7.8	NIL	5 days
17	Senthil	45/M	11367	Rt inguinal hernia	Open hernia repair	55min	NIL	487	112	3.7	635	120	4.8	NIL	3 days
18	Suresh	25/M	13256	Subacute appendicitis	Open appendicectomy	45min	NIL	345	78	4.5	567	96	7.6	NIL	3 days
19	Karthick	35/M	15643	Subacute appendicitis	Open appendicectomy	35 min	NIL	238	98	5.8	578	110	7.5	NIL	4 days
20	Kumaresan	40/M	17849	Rt inguinal hernia	Open hernia repair	1hr 7 min	NIL	345	112	5.4	1035	176	16.6	Present	9 days

21	Karthikeyan	35/M	15634	Symptomatic cholelithiasis	Open cholecystectomy	1hr 55 min	NIL	235	76	5.5	1098	167	14.8	Present	10 days
22	Padmanaban	39/M	19876	Subacute appendicitis	Open appendicectomy	1hr 05min	NIL	456	87	8	789	123	10.5	NIL	5 days
23	pughal	45/M	12436	Symptomatic cholelithiasis	Open cholecystectomy	1hr 25min	NIL	236	89	3.9	1035	145	14.9	Present	11 days
24	Mangai	26/F	13478	Subacute appendicitis	Open appendicectomy	45min	NIL	345	78	3.5	435	110	5.5	NIL	3 days
25	Devi	39/F	14365	Symptomatic cholelithiasis	Open cholecystectomy	1hr 55 min	NIL	245	98	4.8	1098	198	15.8	Present	12 days
26	Parimala	34/F	16348	Subacute appendicitis	Open appendicectomy	59 min	NIL	236	90	2.7	456	98	4.9	NIL	2 days
27	Gopal	36/M	14587	Rt inguinal hernia	Open hernia repair	1hr 05min	NIL	345	78	3.9	536	98	7.6	NIL	4 days
28	Anandh	28/M	15643	Symptomatic cholelithiasis	Open cholecystectomy	1hr 15min	NIL	265	98	4.9	1087	178	15.8	Present	14 days
29	Anjalai	39/F	13567	Subacute appendicitis	Open appendicectomy	55 min	NIL	345	109	3.8	594	110	5.8	NIL	4 days
30	Prasanth	34/M	17834	Lt inguinal hernia	Open hernia repair	1hr 15min	NIL	243	105	4.6	349	156	6.5	NIL	6 days
31	Kuppusamy	37/M	15629	Subacute appendicitis	Open appendicectomy	35 min	NIL	439	89	4.5	635	110	7.8	NIL	4 days
32	Murugaiyan	24/M	14376	Subacute appendicitis	Open appendicectomy	55 min	NIL	289	90	3.4	1055	156	16.8	Present	13 days
33	Raja sekar	37/M	13675	Symptomatic cholelithiasis	Open cholecystectomy	1hr30min	NIL	345	97	3	765	119	7.8	NIL	6 days
34	Vairavam	38/M	16753	Rt inguinal hernia	Open hernia repair	1hr 05min	NIL	456	99	4.9	535	123	6.8	NIL	5 days
35	Rajamani	44/F	15643	Symptomatic cholelithiasis	Open cholecystectomy	1hr 16 min	NIL	223	78	3.8	678	145	7.8	NIL	6 days
36	Kuberan	45/M	17654	Subacute appendicitis	Open appendicectomy	45 min	NIL	256	98	5.9	535	110	6.5	NIL	4 days
37	Arumugam	23/M	16543	Lt inguinal hernia	Open hernia repair	1hr	NIL	346	112	4.5	1034	178	15.8	Present	15 days
38	Hariharan	42/M	17634	Rt inguinal hernia	Open hernia repair	1hr 30min	NIL	239	89	4.9	1098	198	14.7	Present	13 days

39	Muguntha krishnan	18/M	14537	Subacute appendicitis	Open appendicectomy	1hr 35min	NIL	298	87	3.9	1198	155	11.8	Present	12 days
40	Rani	25/F	17654	Subacute appendicitis	Open appendicectomy	1hr 5 min	NIL	167	78	2.9	987	178	13.9	Present	10 days
41	Rasathi	45/F	16578	Symptomatic cholelithiasis	Open cholecystectomy	1hr05min	NIL	345	86	4.7	578	98	7.8	NIL	6 days
42	Saraswathi	34/F	17624	Subacute appendicitis	Open appendicectomy	45 min	NIL	287	76	3.9	675	110	5.8	NIL	4 days
43	Kumarasamy	38/M	13765	Rt inguinal hernia	Open hernia repair	55 min	NIL	178	89	4.9	785	110	7.9	NIL	8 days
44	Vinoth	48/M	18765	Subacute appendicitis	Open appendicectomy	1hr 30min	NIL	245	98	2.5	1198	176	14.7	Present	11 days
45	Vani	29/F	18734	Symptomatic cholelithiasis	Open cholecystectomy	1hr 55 min	NIL	289	105	4.7	1076	195	12.8	Present	13 days
46	Kokila	19/F	14587	Subacute appendicitis	Open appendicectomy	1hr 39 min	NIL	309	113	5.9	987	178	10.4	Present	10 days
47	Rathika	36/F	16578	Symptomatic cholelithiasis	Open cholecystectomy	1hr 05min	NIL	398	119	4.9	537	140	7.5	NIL	6 days
48	Ramalingam	45/M	13987	Subacute appendicitis	Open appendicectomy	1hr 30 min	NIL	287	89	2.9	1198	158	11.8	Present	10 days
49	Rajamanikam	39/M	19876	Lt inguinal hernia	Open hernia repair	1hr	NIL	307	98	3.9	567	118	6.8	NIL	6 days
50	Murugan	45/M	16548	Symptomatic cholelithiasis	Open cholecystectomy	1hr 08min	NIL	298	113	4.9	675	136	7.5	NIL	7 days
51	Ramkumar	38/M	17845	Subacute appendicitis	Lap appendicectomy	1hr 35min	NIL	215	86	3.9	415	98	5.5	NIL	3 days
52	Karnan	42/M	16587	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 45min	NIL	315	98	4.9	450	104	5.8	NIL	3 days
53	Kumaran	39/M	15467	Subacute appendicitis	Lap appendicectomy	1hr 05min	NIL	416	100	5.1	486	102	5.9	NIL	4 days
54	Bala krishnan	28/M	13457	Symptomatic cholelithiasis	Lap cholecystectomy	1hr25min	NIL	515	78	3.9	550	98	5.1	NIL	3 days
55	Rajendran	32/M	16578	Subacute appendicitis	Lap appendicectomy	55 min	NIL	315	90	4.8	330	95	5.9	NIL	2 days
56	Naga selvi	42/F	17685	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 05min	NIL	419	89	3.5	512	97	5.3	NIL	3 days

57	Saroja	38/F	14567	Subacute appendicitis	Lap appendicectomy	1hr	NIL	390	95	4.9	415	110	5.8	NIL	3 days
58	Sushela	32/F	16754	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 05min	NIL	490	79	5.1	530	98	6.8	NIL	4 days
59	Ravi kumar	43/F	18734	Subacute appendicitis	Lap appendicectomy	48 min	NIL	530	85	5.8	570	95	6.1	NIL	3 days
60	Kamalamal	39/F	17654	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 15 min	NIL	630	90	3.9	678	95	4.5	NIL	3 days
61	Govindammal	44/F	16539	Subacute appendicitis	Lap appendicectomy	1hr 30min	NIL	350	98	4.9	950	168	9.8	Present	13 days
62	kathiresan	34/M	19834	Subacute appendicitis	Lap appendicectomy	55 min	NIL	250	110	3.8	355	116	4.7	NIL	3 days
63	Balamurugan	28/M	14768	Subacute appendicitis	Lap appendicectomy	1hr05min	NIL	345	97	4.9	567	111	5.9	NIL	4 days
64	Kathamuthu	37/M	18765	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 25min	NIL	445	87	5.1	675	98	6.5	NIL	4 days
65	Velan	45/M	16735	Rt inguinal hernia	TAPP	1hr 55 min	NIL	345	98	5.7	657	130	7.5	NIL	5 days
66	Vairamani	38/F	15673	Symptomatic cholelithiasis	Lap cholecystectomy	1hr30min	NIL	267	105	6.9	445	156	9.3	NIL	5 days
67	Raghavan	36/M	17865	Subacute appendicitis	Lap appendicectomy	1hr38 min	NIL	365	98	5.5	478	110	6.4	NIL	4 days
68	Anbumani	38/F	18765	Subacute appendicitis	Lap appendicectomy	1hr08min	NIL	455	78	5.6	567	98	9.6	NIL	3 days
69	Karthika	36/F	14365	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 37min	NIL	376	87	6.4	678	110	7.6	NIL	3 days
70	Bharathi	26/F	17654	Subacute appendicitis	Lap appendicectomy	48 min	NIL	276	98	3.4	678	110	4.7	NIL	3 days
71	Kaviya	28/F	15643	Subacute appendicitis	Lap appendicectomy	1hr 05min	NIL	376	88	4.8	665	97	7.5	NIL	4 days
72	Daniel	29/M	17648	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 23min	NIL	478	77	6.7	567	87	7.8	NIL	3 days
73	Nidhi	26/M	18675	Subacute appendicitis	Lap appendicectomy	1hr 05min	NIL	356	98	4.8	568	110	5.7	NIL	4 days
74	Fazil	34/F	16738	Subacute appendicitis	Lap appendicectomy	1hr 15min	NIL	445	110	3.5	675	115	5.3	NIL	3 days

75	Kumaresan	22/M	18754	Subacute appendicitis	Lap appendicectomy	1hr 09min	NIL	376	79	4.8	455	110	5.7	NIL	3 days
76	Archana	25/F	16754	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 45min	NIL	445	85	4.9	598	87	5.8	NIL	3 days
77	Roja	26/F	17654	Subacute appendicitis	Lap appendicectomy	55 min	NIL	348	87	5.1	576	98	5.9	NIL	4 days
78	Gayathri	29/F	19876	Symptomatic cholelithiasis	Lap cholecystectomy	1hr10min	NIL	276	98	4.1	379	110	5.5	NIL	3 days
79	Abirami	35/F	16547	Subacute appendicitis	Lap appendicectomy	1hr05min	NIL	378	101	5.9	555	107	6.8	NIL	4 days
80	Gomathi	44/F	18723	Symptomatic cholelithiasis	Lap cholecystectomy	1hr58min	NIL	456	76	4.9	645	98	6.8	NIL	4 days
81	Swathy	38/F	18763	Subacute appendicitis	Lap appendicectomy	1hr18min	NIL	398	97	5.4	501	110	6.1	NIL	5 days
82	Ganapathy	42/M	16745	Symptomatic cholelithiasis	Lap cholecystectomy	1hr56min	NIL	455	76	6.8	988	178	11.1	Present	11 days
83	Vinayagam	34/M	17654	Subacute appendicitis	Lap appendicectomy	1hr 08min	NIL	376	98	7.98	487	110	8.5	NIL	4 days
84	Devan	43/M	18765	Subacute appendicitis	Lap appendicectomy	1hr 55 min	NIL	567	78	5.4	675	89	6.5	NIL	5 days
85	Selvaraj	37/M	17865	Symptomatic cholelithiasis	Lap cholecystectomy	1hr13min	NIL	455	98	6.3	558	100	7.1	NIL	4 days
86	Gugan	18/M	15683	Subacute appendicitis	Lap appendicectomy	55min	NIL	578	110	5.3	597	115	5.9	NIL	4 days
87	Arumugan	38/M	17643	Symptomatic cholelithiasis	Lap cholecystectomy	1hr16 min	NIL	476	108	4.8	587	114	6.1	NIL	3 days
88	Aravindan	39/M	18534	Subacute appendicitis	Lap appendicectomy	55 min	NIL	334	98	5.8	667	110	6.5	NIL	3 days
89	Govindaperumal	41/M	16549	Symptomatic cholelithiasis	Lap cholecystectomy	1hr21min	NIL	445	97	5.4	615	110	6.5	NIL	3 days
90	Narmadha	28/F	18765	Subacute appendicitis	Lap appendicectomy	54 min	NIL	345	105	6.3	649	110	6.9	NIL	3 days
91	Kuppusamy	34/M	17638	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 05min	NIL	445	78	4.8	668	90	6.6	NIL	3 days
92	Kandaswamy	39/M	16845	Subacute appendicitis	Lap appendicectomy	59 min	NIL	345	89	6.4	657	95	7.1	NIL	4 days

93	Gurusamy	38/M	12675	Subacute appendicitis	Lap appendicectomy	1hr 38min	NIL	445	91	3.8	559	99	5.1	NIL	3 days
94	Madaswamy	39/F	14567	Symptomatic cholelithiasis	Lap cholecystectomy	1hr45min	NIL	378	98	4.8	576	119	5.8	NIL	4 days
95	Kamalamal	40/F	16543	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 15min	NIL	415	105	5.1	499	108	6.1	NIL	3 days
96	Paulia	23/F	18763	Subacute appendicitis	Lap appendicectomy	1hr59 min	NIL	324	98	3.4	988	198	11.3	Present	13 days
97	Jeslin	34/F	17865	Subacute appendicitis	Lap appendicectomy	1hr 25 min	NIL	256	99	4.5	465	119	5.9	NIL	3 days
98	Venugopal	19/M	16745	Subacute appendicitis	Lap appendicectomy	1hr 30 min	NIL	398	110	5.1	564	129	6.8	NIL	3 days
99	Levo ram	21/M	13098	Subacute appendicitis	Lap appendicectomy	1hr 31min	NIL	411	98	5.6	543	114	6.8	NIL	3 days
100	Lawrance	34/M	17648	Symptomatic cholelithiasis	Lap cholecystectomy	1hr 28min	NIL	487	110	6.3	576	115	6.98	NIL	3 days

INSTITUTIONAL ETHICAL COMMITTEE
GOVT.KILPAUK MEDICAL COLLEGE,
CHENNAI-10
Protocol ID No.17/01/2015 Dt. 20.01.2015
CERTIFICATE OF APPROVAL

The Institutional Ethical Committee of Govt. Kilpauk Medical College, Chennai reviewed and discussed the application for approval "Stress Response in open and Laparoscopic Procedures". -For Project Work-submitted by Dr.V.P.Raja Sekar, PG in General Surgery, KMC, Chennai- 10.

The Proposal is APPROVED.

The Institutional Ethical Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

20/1/15

CHAIRMAN,
Ethical Committee
Govt.Kilpauk Medical College,Chennai

19/1/2015

GOVT. KILPAUK MEDICAL COLLEGE * 20 JAN 2015 * Kilpauk, Chennai-10.